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EXPLANATORY NOTES

FOR U. S. D. A.

DEPARTMENT OF AGRICULTURE

BUDGET ESTIMATES

FISCAL YEAR

1942

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(Volume 3)

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FOREST SERVICE

(a) SALARIES AND EXPENSES - PREAMBLE

Changes in Language

A change of language is recommended in the third or last proviso under the Preamble to the Forest Service section of the Act, as follows (new language underscored, deleted matter enclosed with brackets):

Provided further, That the /Forest Service may rent equipment to other Federal agencies at rates sufficient to reimburse the appropriations of the Forest Service that would otherwise be chargeable with the cost of the repair, maintenance, and depreciation of such equipment/ appropriations for the work of the Forest Service available for the operation, repair, maintenance and replacement of motor and other equipment may be reimbursed for use of such equipment on projects of the Forest Service chargeable to other appropriations, or on work of other Federal agencies, when requested by such agencies, reimbursement to be made from appropriations applicable to the work on which used at rental rates fixed by the Chief Forester based on the actual or estimated cost of operation, repair, maintenance, depreciation and equipment management control, and credited to appropriations currently available at the time adjustment is effected: Provided further, That the Forest Service may rent equipment for fire control purposes to State, county, private, or other non-Federal agencies cooperating with the Forest Service in fire control under the terms of written cooperative agreements, the amount collected for such rental to be credited to appropriations currently available at the time payment is received, as follows:

The suggested change in the appropriation language is designed to facilitate the use, distribution, repair, and replacement of Forest Service equipment. The utilization of equipment to its full capacity, or approximately so, which is practicable under the requested authorization, would render it possible to accomplish more work with less equipment. Under the limitations of the prevailing authorization, full utilization of equipment is frequently not obtainable.

The activities of the Forest Service in the construction and maintenance of roads, trails, dams, buildings, and miscellaneous improvements, the protection of the national forests from fire, insects, and disease, and the management of the national forests generally necessitate the utilization of a large amount of automotive and construction equipment. This equipment is used at widely scattered points, most of it in areas developed with a minimum of transportation facilities and where commercial equipment is not available. The amount of equipment at any one location may range from one unit to twenty or more items

and the period of use on any one project ranges from a few days to several months. The equipment almost invariably is used on miscellaneous projects financed from various appropriations.

Because of the distance involved, and the impossibility of renting commercial equipment within a reasonable distance, it is necessary to have great flexibility in connection with transfer of units between projects even though they are financed from different appropriations. Other factors which make such flexibility necessary in a given location are (1) small size of projects where one type of equipment may be needed for only a day or two; (2) changing climatic conditions; (3) extreme variations in progress of work; (4) breakdowns of equipment; (5) emergency requirements of forest fire suppression; (6) ever changing demands of numerous small projects, most of which are working against the time limit of the short construction season prevailing in most of the national forests.

The above factors demonstrate conclusively the necessity for pooling equipment and arranging for a distribution of cost charges to all projects and appropriations through the installation of rental schedules. Such a procedure would be in contrast with the alternate plan of using equipment purchased from a given appropriation exclusively on projects financed from that appropriation. It is obvious that, under conditions which exist on the national forests where the same type of equipment is needed on work chargeable to various appropriations, a strict adherence to the latter procedure would result in absurd and indefensible situations.

The needs of the development, protection, and management activities on the national forests can best be met by operating central pools of equipment, which have the following advantages and economies:

- (1) Reduction in total number of pieces of equipment with resulting reduction in repair parts on hand.
- (2) Reduction in losses due to obsolescence, through more continuous use. High cost of repair parts on out-of-date equipment is largely avoided.
- (3) Increased efficiency of equipment operation through using up-to-date machines.
- (4) A more equitable distribution of equipment costs to projects and a reduced over-all cost through using nearby equipment, avoiding long hauls or long delays.
- (5) Maximum use of equipment through prompt release on completion of projects and re-distribution, wherever needed, instead of limiting use to work under only one appropriation.

- (6) Under a centralized equipment pool system and using a rate for repair and depreciation based on average costs of all similar machines in the area, the administrative officer definitely determines his liabilities and does not have to hold a reserve for repairs. Otherwise, often a machine may unexpectedly break down when there are not sufficient funds available to cover its repair and the project work must be curtailed. Under the central pool system, if a machine breaks down another is sent out to take its place.
- (7) Centralizing the management of equipment likewise centralizes responsibility for the condition of the equipment, which results on the average in (a) better and more economical preventive maintenance and repair practices, (b) accumulation of reliable repair cost data reflecting relative efficiency and suitability for the work of various makes and sizes of machines which, in turn, is of real value as a guide for replacement purchases and for determining when a machine should be condemned.

A collateral matter which has been worked into a second proviso would authorize the Forest Service to rent equipment to State and private agencies who cooperate with the Forest Service in forest protection. The fire control equipment developed by the Forest Service is of special manufacture and cannot be purchased in the commercial market on short notice. In many cases the forested areas protected by the States and timber protective associations (and the protection of which frequently is an essential element in the protection of adjacent national forest timber) are not large enough to warrant the purchase of the larger and more expensive items of special equipment, but fires frequently occur upon which such equipment could be used to advantage. In other cases, because of a series of fires, needs arise for equipment in addition to the quantities owned by the outside agency. If the suggested authority is approved, it will facilitate the pooling of equipment to the benefit of everyone concerned, including the Federal properties. There would also be a saving to the Federal Government through the collection of rentals because under existing circumstances equipment is occasionally loaned to State and private agencies without reimbursement in serious emergencies.

(b) GENERAL ADMINISTRATIVE EXPENSES

Appropriation Act, 1941.....	\$600,000
Transferred 1941, pursuant to Reorganization Plan No. IV, to the Post Office Department	<u>- 1,480</u>
Net available, 1941.....	598,520
Budget Estimate, 1942.....	<u>598,520</u>

PROJECT STATEMENT

Project	1940	1941 (Estimated)	1942 (Estimated)
General administration and business service.....	\$607,500	\$598,520	\$598,520

WORK UNDER THIS APPROPRIATION

The work under this appropriation provides for leadership, coordination, planning, and control of the far-flung Forest Service organization and for the formulation of the broad basic policies and methods for the guidance of the personnel of the Service and so as to enable other agencies to do the parts for which they are responsible in creating and maintaining a forest economy which will benefit human welfare to the utmost possible. It provides also for the service and facilitating agencies which are necessary in the central office relating to personnel management, information and education, drafting, business management, procurement, and finance and fiscal control, as well as for the necessary inspection and audit of field operations.

The function of the Forest Service is to bring about a multiple use of the forest lands of the United States in a manner which will be most productive to the social and economic structure and to redeem the responsibility of the Federal Government in working out solutions of the Nation's forestry problems.

On the national forests this means direct scientific and technical management for the production of timber, forage for range livestock, water, wildlife, and recreation. It means the protection of vast areas of public and intermingled private lands from fire and tree diseases, as well as the integration of the management of all forest resources, in order that they will contribute as fully as possible to economic and social betterment. It means, in short, the administration of the national forests in the broadest public interest and the demonstration of proper forest and related land management.

On the privately-owned forest lands, which in major part are being badly handled from a national point of view, it means leadership, planning, and coordination in the development of forest management through the dissemination of technical information and through cooperation with the States and private agencies in protection against fire, forest planting, and in obtaining improved forest management practices.

The attainment of these objectives requires the conduct of a large amount of research in all phases of forestry and forest range management, both independently and in cooperation with other technical and industrial agencies. Research in the technique of protecting, improving, and utilizing the forest resources and in the profitable use of land for forestry is essential to the success of the activities on the national forests and private forest lands. This research deals with problems of broad regional or national scope rather than those of a purely local character and is conducted under the provisions of the McSweeney-McNary and Clarke-McNary Acts.

Operating in three broad fields of activity, through its many field and cooperator's offices, the Forest Service is confronted with a complex and unusually difficult general administrative problem. There are approximately 1,000 field offices of the Forest Service, the majority of which are "one-man offices", where the opportunities for personal contacts with other employees are infrequent. Under these conditions there must be a constant flow of information and instructions from

the central office to the field on policy and other matters. Frequent inspections and audits are also necessary.

With an awakened public interest in conservation generally, and particularly in forestry, the demands made by the public for information are unusually heavy. Requests for information from Congressmen, Senators, schools, colleges, women's clubs, associations, civic organizations, and individuals, demands for the construction of certain projects, and the participation of outsiders in personnel, claims, and other cases all add to the work of the central office. The proper integration of Forest Service programs with the programs of other Federal agencies is also time-consuming, including as it does the integration of Forest Service programs to supplement national plans of defense.

The work of the Forest Service is closely allied with that of many other Government agencies, notably Soil Conservation Service, Bureau of Entomology and Plant Quarantine, the Division of Grazing, Bureau of Plant Industry, Bureau of Public Roads, Fish and Wildlife Service, Bureau of Agricultural Economics, Agricultural Experiment Stations, National Resources Planning Board, etc. Because of the enormous areas of Federally-owned lands under its jurisdiction and the leadership expected of it in forestry matters nationwide, the activities of the Forest Service are also of great importance to State, county, and regional planning boards. Under these circumstances the general administrative functions of the Forest Service, especially those of planning, coordination, and policy formulation, are of unusual importance and make heavy time demands.

Because of its numerous fields of responsibility and resulting activity throughout the forested sections of all the States and territories, the Forest Service organization is of necessity and as a result of thorough study, test, and deliberate choice very thoroughly decentralized. The Division of Fire Control, for example, with responsibility for leadership and control (1) over a field force of from 5,000 to at times more than 20,000 persons engaged primarily in fire control work, and (2) over expenditures up to 10 million dollars a year, is composed in the Washington office of only 4 persons above the clerical grade. The other functional divisions in the main office are similarly restricted in size. The organization of the general administrative divisions and those which provide service to the functional divisions of the Chief's Office follows the orthodox pattern for a bureau of its size. It consists of the Chief's Office proper, Personnel Management, Fiscal Control, Information and Education, Operation, and the sections of Forest Land Planning, Drafting, the library, and photography. It has been difficult to provide the personnel necessary in the general administrative divisions to adequately serve the Forest Service organization and to meet the needs for providing leadership for the urgently needed but lagging national forestry program.

SUPPLEMENTAL FUNDS

Projects	:	:	Estimated
	:	:	Obligations,
	:	:	1940
	:	:	1941
<u>Emergency Relief Appropriation Act of 1939:</u>	:	:	
General administrative expenses	:	:	\$22,253
	:	:	

(c) NATIONAL FOREST PROTECTION AND MANAGEMENT

Appropriation Act, 1941.....	\$11,500,000
White Mountain National Forest	
Hazard Reduction.....	+72,688(a)
Allotments 1941, to be transferred in 1942	
estimates to:	
"Salaries and Expenses, Bureau of	
Agricultural Economics".	-18,500
"White Pine Blister Rust Control".	-644,000
Total available, 1941.....	10,910,188
Budget estimate, 1942.....	10,986,000
Increase.....	<u>75,812</u>

- (a) This is the amount carried forward into 1941 from a \$500,000 appropriation provided in the First Deficiency Appropriation Act, 1939, and which remains available until June 30, 1941, in accordance with the "Department of Agriculture Appropriation Act, 1941."

PROJECT STATEMENT

Projects	1940	1941 (estimated)	1942 (estimated)	Increase or Decrease
1. General management, operation, and regulation of national for- est properties, including en- forcement of Federal laws and regulations applicable to the national forests.....	\$4,740,353	\$4,739,557	\$4,739,557	\$ —
2. Maintenance of improvements other than roads and trails (includes telephone lines, fences, lookout towers and ob- servatories, fire breaks, of- fices, barns, garages, dwellings, outhouses, water developments, pipe lines, public camp grounds, landing fields, etc.).....	507,265	425,236	425,236	—
3. Forest fire control, including prevention of fires and mainte- nance of a detection and "smoke- chaser" organization.....	2,475,297	2,318,179	2,318,179	—
4. Control of tree-destroying in- sects and rodents on national forests.....	103,000	95,674	95,674	—
5. Timber and forest products sales, free and administrative timber use, timber surveys, management plans, and timber stand improvement	1,192,468	1,182,860	1,331,360	+148,500 (1)
6. Allocation and issuance of grazing permits, supervision of range use by domestic livestock, range surveys, and range manage- ment plans on national forests..	567,191	551,839	551,839	—
7. Protection of the wildlife re- source, preservation of forest conditions conducive to the pro- pagation of wildlife, reduc- tion in number of game animals in overstocked areas, wildlife surveys, and management plans...	228,506	208,081	208,081	—

PROJECT STATEMENT - Continued

Projects	1940	1941 (estimated)	1942 (estimated)	Increase or Decrease
8. Supervision of recreational use of national forests, includ- ing plans, operating, policing, enforcing State sanitary laws, and garbage disposal on public camp grounds.....	\$ 361,270	\$ 344,691	\$ 344,691	--
9. Land-use management on na- tional forests, including rent- al of land, land classifica- tion; action on claims entered under public land laws; location and posting of national forest boundaries; general surveys, plans and maps; aerial photo- graphy; land exchange	351,145	326,283	326,283	--
10. Protection, development, and management of the water re- sources of the national forests:	76,821	73,987	73,987	--
11. Construction of improvements other than roads and trails. (Includes telephone lines, fences, lookout towers and ob- servatories, firebreaks, of- fices, barns, garages, dwell- ings, outshouses, water devel- opments, pipe lines, public camp grounds, landing fields, etc.).....	299,206	197,029	197,029	--
12. Reforestation and revegeta- tion of denuded national forest areas	400,000	374,084	374,084	--
13. Hazard reduction, fire pre- vention, and timber use, White Mountain National Forest	365,081	72,688	--	(2) \$ -72,688
Unobligated balance	878	--	--	--
Total	11,668,481	10,910,188	10,986,000	+ 75,812

INCREASE AND DECREASE

The increase of \$75,812 in this item in the fiscal year 1942 consists of an increase of \$148,500 for the administration of the rapidly increasing volume of commercial timber sales, and a decrease of \$72,688 in the special fund applicable to hazard reduction, etc., in the White Mountain National Forest, as follows:

(1) Increase of \$148,500 for timber sales:

Objective: To enable increased harvesting of national forest timber which is in demand and ready for cutting, to provide employment for local workers and raw material for wood-consuming industries, and to increase receipts to the Treasury. (Receipts for timber cut are two to three times greater than cost of administration.)

The Problem: More national forest timber was cut during the fiscal year 1940 than in any previous year. Funds available for the administration of this phase of national forest work were stretched to the limit, even to the extent of slighting other needed work. Applications for additional sales of national forest timber were refused because of lack of personnel to handle additional business. The demand continues strong during the current fiscal year, and all the indications are that the cut will equal, and possibly exceed, the 1940 cut. Additional funds are urgently needed to finance more timber sales in the fiscal year 1942. Many national forests, particularly those east of the Great Plains, would have a far greater annual cut if it were possible to handle the demand for small "family-size" timber sales. By and large, national forest sales do not enter directly into competition with the production of timber from private lands. Rather, the cut from the national forests frequently is integrated with that from intermingled and adjacent private holdings.

In the Pacific Coast States there are large volumes of national forest timber ready for cutting, and many large sawmills are partially or wholly dependent upon these supplies for continued operation. Most of these sales will be large in size, but there is also a growing opportunity for making small sales to operators who deliver logs to large established mills. On the Umpqua Forest in southwestern Oregon, for example, recent demands for national forest stumpage have led to the initiation of a program of comparatively small sales. Further developments along this line require additional appropriations to finance personnel to make and administer sales.

In the national forests in the Rocky Mountain States, from the Canadian line to the Mexican border, most of the timber sales are comparatively small. In the Inland Empire the available western white pine on national forests is assuming greater importance each year, with the decreasing supplies of this timber in private ownership, and is vital to the continuance of the lumber industry in that area. In addition, a recent development is the trial shipments of Engelmann spruce

from the Rocky Mountains to Wisconsin for use as pulpwood, as an offset to reduced importations of pulpwood from Canada and Europe. Increasing numbers of applications are being received for the sale of national forest timber for railroad ties and lumber for local consumption and shipment to the mid-West. Elsewhere throughout the Rocky Mountains there is an opportunity for increased number and volume of small sales to provide timber for local markets.

In the Lake States and the Northeast practically all of the national forest timber-sale business is conducted by small sales. It is possible to market a variety of products on these national forests because of local markets. The timber on the national forests is rather scattered and lends itself well to small operations. Much of it, however, is of relatively high value. For example, small patches of old-growth northern hardwoods, in quantities of a few thousand board feet may be sold at stumpage prices ranging from \$3 to \$12 or more per thousand board feet. Much of this sort of timber is used in manufacturing small articles, such as wooden bowls, bowling pins, shoe heels, and chair rungs. This means that, in addition to returning high unit stumpage values in the form of national forest receipts, sales of this character furnish many man-days of work per thousand board feet in logging and manufacture. It is not now possible to handle all the requests for national forest timber sales in these regions.

In the national forests of the South there is an outstanding need for increasing timber sales in order to provide more employment for laborers living within and adjacent to the forests. Decreasing markets for cotton aggravate the already unsatisfactory economic conditions of rural southern labor, and the national forests should go just as far as possible in supplying additional opportunities for employment. The demand for timber sales from the southern forests, particularly those in the Coastal Plains, has exceeded anticipations. It is no longer possible to sell all the timber for which application is made, because of inadequate financial resources, although increased sales are fully justified on the basis of present stands of merchantable material. Excellent market conditions exist for the forest products available for cutting, and there is a very urgent need for a considerable expansion in the small "family-sized" timber sale. Additional money for expenditure in this section of the country is very urgently needed to enable more intensive management of the timber resources on the national forests, to assist in development of these forests to the maximum contribution to local economy, and to obtain additional receipts for the Treasury.

Significance: Studies show that the labor involved in logging and milling national forest timber averages at least 3 man-days per thousand board feet. On this basis, the 1,740,271,000 feet of timber (exclusive of free use) cut in the fiscal year 1940 on the national forests provided employment sufficient to support more than 20,000 families for the year. In addition \$3,943,023 of timber sale receipts were deposited in the Treasury as a result of the cutting in the fiscal year 1940. One of the chief purposes of national forest administration is to manage the timber resources

on a sustained yield basis. This insures not only continuous supplies of raw material in the form of pulpwood, sawlogs, fuelwood, etc., for basic industries, but also substantial returns to the Treasury and to labor in the form of employment. More timber could have been cut in fiscal year 1940 had more funds been available for handling it.

Plan of Work: National forest timber is sold in accordance with the prescriptions of the timber management plans which are based upon the quantities of timber which are mature and available for cutting, calculated growth rate, and the needs of local industries. The additional funds requested under this appropriation will be used for making and administering timber sales. Detailed estimates of the amount of timber available in each particular logging chance must be made prior to the appraisal and sale of the timber. This requires men for cruising the timber and making the necessary computations. After the amount and location of the timber has been accurately determined, each unit of timber must be appraised to fix the stumpage values. The process of appraisal requires knowledge of logging conditions and costs, as well as selling values of lumber.

Practically all the increase is needed for actual timber sale preparation and administration. This involves marking the trees to be cut, supervising the cutting in accordance with the terms of the timber sale agreement, and scaling the logs or other products to determine the volume cut and removed as a basis for payments. Additional clerical help also will be required in forest supervisors' offices to handle the increased work which will result from a larger number of timber sales and a larger volume cut.

(2) A decrease of \$72,688 for hazard reduction, fire prevention, and timber use on the White Mountain National Forest in New Hampshire and Maine. Of the \$500,000 appropriated in the First Deficiency Act of 1939 for the removal of the hazards due to wind-blown timber on the White Mountain National Forest, \$62,231 was expended in 1939, \$365,081 in 1940, and \$72,688 will be expended in the fiscal year 1941. With the exhaustion on June 30, 1941, of this \$500,000 appropriation, it will be necessary to rely upon the regular national forest appropriations for work in this area in the fiscal year 1942.

CHANGE IN LANGUAGE

The proviso reappropriating the unobligated balance of the appropriation "National Forest Protection and Management" contained in the First Deficiency Appropriation Act, fiscal year 1939, has been eliminated because the funds carried forward from the fiscal year 1940 will be fully obligated in the fiscal year 1941.

WORK UNDER THIS APPROPRIATION

General. This appropriation covers all activities relating to the administration, protection, and development of the national forests except the

special appropriations for the construction and maintenance of roads and trails under the Federal Highway Act and the Act authorizing the expenditure of 10 percent of national-forest receipts for this purpose; the acquisition of additional forest lands; water rights; emergency expenditures for fire suppression; and expenditures from funds deposited to the credit of the Forest Service by counties, States, associations, and individuals for fire prevention and suppression, brush disposal, construction and maintenance of improvements, and reforestation.

Project 1. General management, operation, and regulation of national forest properties, including enforcement of Federal laws and regulations applicable to the national forests:

Objective: To provide the basic (skeleton) forest ranger district and regional organization responsible for the custodianship of the national forests, including enforcement of laws and regulations, the handling incident thereto of miscellaneous other duties, and the supervision of special (in large part seasonal) workers required for fire protection, timber sales, range use, and other functional activities on the national forests, as described under succeeding budget work projects of the Forest Service; all to the end that the Federally-owned forest land and resources entrusted to Forest Service administration will be protected, developed, and utilized in such manner as will render the greatest possible service to the Nation as a whole.

Problem: Within the national forest boundaries is an area of 227 million acres, of which 176,500,000 acres are in Government ownership. Geographically, this area reaches into 40 States, Alaska, and Puerto Rico.

The administration of so vast an area presents difficulties and complexities in management not commonly found in many other governmental undertakings. Two separate classes of work are involved: (1) The basic custodial and overall duties which are always present, practically regardless of the amount of special (functional) work that may develop from season to season. This basic recurrent work requires a skeleton organization of rangers and others which may be supplemented as need be to meet the varying demands of special (functional) work, such as those timber sales which cannot be handled incidental to the basic custodial duties; and (2) the special (functional) work which, as above stated, cannot be absorbed as a part of the day-to-day recurrent duties of the rangers and other members of the basic organization. This special (functional) work is composed of separate activities of large volume, much of which varies greatly from season to season and year to year, such as the fire-control job, timber sales, recreation use, range and wildlife management, and other "functions" covered by separate budget projects discussed in succeeding pages.

This particular project deals only with the first of the two classes of work mentioned above, that is "the basic custodial and over-all duties". To facilitate administration, the national forest area is divided into 10 regions, 146 national forest administrative units, and 766 ranger districts. The personnel of the basic organization, which is charged with the field administration, work planning, and general supervision and operation of these geographical units, is also responsible for the protection of the national forests from fire, insect and tree-disease epidemics, and trespass, and for the integration of their management with economic and social problems of both national and local scope, in order that the natural resources of the national forests will contribute as fully as possible to the solution of such major problems as the production of needed timber and other forest products, utilization of forage without injury to the vegetative cover, flood control in major and minor watersheds, demands for outdoor recreation by millions of people, the permanency and continued prosperity of dependent communities, national defense, etc.

The following is indicative of the economic importance of the national forests:

- (a) Approximately 10 percent of the land area of the United States is included within their boundaries.
- (b) Sales and permits were granted for the cutting of more than two billion feet of timber from the forests in fiscal year 1940.
- (c) They returned in excess of five and one-half million dollars in 1940 to the Federal treasury as income from the sale of timber products, grazing, and land rentals.
- (d) They provide recreational opportunities to more than thirty million visitors annually. These people are estimated to spend more than \$200,000,000 during their trips to the forests.
- (e) They provide range for over 12 million head of domestic livestock.
- (f) Nearly 4,000,000 people who live in and near the national forests are supported in whole or in part through the management and utilization of them and their resources.
- (g) They provide watershed protection of municipal water supplies for cities and towns with a total population of approximately 6,000,000 as well as water supplies which are immensely valuable to agricultural interests.
- (h) They provide the habitat for a large majority of the big game animals of the country, and for millions of small game animals, birds, and fur-bearers.

- (i) They provide a measure of assurance of a future timber supply. At present only 2,000,000,000 feet out of an estimated allowable cut of 6,500,000,000 feet are being removed from the national forests.
- (j) They provide areas of land in large blocks already in Government ownership which may be used for military purposes in periods of national emergency. Witness the recent transfer to the War Department of the Choctawhatchee National Forest, Florida, and the use by that Department of large parts of the DeSoto National Forest, Mississippi, and the Mark Twain National Forest in Missouri.

Significance: The salaries and expenses of the basic (skeleton) organization, with which this project is concerned, include only the following:

- (a) Salaries of general administrative and other all-purpose personnel, such as forest rangers, forest supervisors and regional foresters, who spread their time over a great variety of activities. This group represents the ground organization, currently on the job to perform the general operative and custodial duties of national forest management and supervision of such functional workers (fire guards, etc.) as may be within his field of jurisdiction. It does not include personnel employed primarily for specific resource functions or special project work mentioned in (2) above.
- (b) Travel expenses of the basic, supervisory, all-purpose employees.
- (c) Other expenses such as rent, heat, light, communication services, miscellaneous supplies and equipment, etc., of a general nature incident to administration and operation, exclusive of those properly chargeable to special projects or functional activities, and to other appropriations.

Specifically, the personnel of the basic organization includes only permanent yearlong employees in the following classes:

- (1) Personnel employed on forest administrative units:

District rangers and assistant district rangers
Forest supervisors and assistant forest supervisors
Forest administrative assistants
General forest clerks
Janitors and building guards

- (2) Personnel employed at regional headquarters:

Regional foresters and associates
Assistant regional foresters in charge of operation, personnel management, and fiscal control, and their principal assistants.
Clerical personnel engaged in all-purpose work, such as operations, personnel management, and finance and accounting to the extent necessary to meet minimum needs of the all-purpose organization.
Janitors and building guards.

Plan of Work: At present the total number of employees carried under this project is 1,510. Of this number 1,356 are employed on forests and ranger districts. The remainder (154) work in and out of the ten regional headquarters offices to which they are assigned.

The total net area under the administrative jurisdiction of this group is 176,494,066 acres, or an average of slightly over 1,200,000 acres per national forest administrative unit. The average area per ranger district is approximately 230,000 acres. Of the employees on this project, 1,119 are in the "field-going" category--approximately one per each 157,725 acres under administration.

Project 2. Maintenance of improvements other than roads and trails. (Includes telephone lines, fences, lookout towers and observatories, fire breaks, offices, barns, garages, dwellings, outhouses, water developments, pipe lines, public camp grounds, landing fields, etc.):

Objective: To maintain all national forest improvements (except roads and trails) to insure maximum usefulness in the protection and administration of the national forests and the utilization of their resources and to lengthen the life of all improvement projects.

Problem: The improvements on the national forests consist of thousands of small projects widely scattered over 176,000,000 acres of national forest territory. Many of these improvements are located at high elevations where damage from heavy snowfall and severe storms is extreme. Many of them are unattended or unoccupied during long periods of time each year, and maintenance charges are naturally higher because of this condition. While many improvements can be maintained at any season of the year, the majority of the improvements on the national forests must be maintained during a very short working season; and certain fire-control, recreational, and range improvements must be maintained immediately after the areas in which they are located become accessible in the spring. Fire control improvements such as telephone lines, lookout towers, fire breaks, and guard cabins must be maintained in advance of the fire season at least to the point of usability. Recreational and range improvements must be maintained prior to public use in the early summer and spring months.

The following table of improvements, as of June 30, 1939, shows the size of the improvement maintenance job on the national forests:

<u>Type of Improvement</u>	<u>Miles or Number</u>
Fire Breaks	11,036
Lookout Houses, Towers, and Observatories	3,171
Airplane Landing Fields	79
Range Fences and Corrals	18,407
Range Driveways and Bridges	5,530
Range Water Developments	11,001
Winter Sports Areas	175
Campground and Picnic Areas	4,652

<u>Type of Improvement</u>	<u>Miles or Number</u>
Recreation Lakes and Swimming Pools	85
Ranger Stations and Other Dwellings	2,257
Barns and Garages	1,970
Offices	752
Water developments for ranger stations, etc. .	1,936
Telephone lines	62,548

Significance: Many of the improvements on the national forests are entirely valueless unless properly maintained. Classes of improvements which fall in this category are telephone lines, fire breaks, lookout towers, fences, water development projects, etc. Such improvements must be maintained to the point of usability if they are to serve their purposes at all. Maintenance work on other classes of improvements may be deferred for a time, but ordinarily there is no financial saving in a program of this kind.

Plan and Progress of Work: It has been possible to maintain the improvements on the national forests during recent years because of the availability of CCC camps and emergency appropriations. These emergency facilities are utilized to the utmost in maintaining improvements which can be reached by employees working under these programs. The comparatively small amount of money available in regular appropriations is conserved for the maintenance of improvements in areas which cannot be reached by emergency crews.

Because of the importance of improvements to the fire control, range management, and recreational activities all national forests have a very carefully worked out plan and schedule for maintaining improvements. In the western forests, with short field seasons, the maintenance of fire control improvements is the first job undertaken in the spring as national forest areas become free of snow. At this season of the year there is a heavy load of maintenance work despite the fact that all improvement maintenance work which is not absolutely necessary for the usability of improvements is deferred until later in the field season.

For those improvements which can be maintained at any season of the year advantage is taken of the presence of fire guards throughout the forests during the summer months. These men are called upon to maintain improvements whenever wet weather during the summer months makes it possible to remove them from their duty stations for short periods.

Project 3. Forest fire control, including prevention of fires and maintenance of a detection and "smokechaser" organization:

Objective: To enable national forest land and resources to make their proper and necessary contribution to national defense, national prosperity, and social welfare. To reduce to a minimum the sum of expenditures for fire control and the losses resulting from fires.

The Problem: From 12,000 to 17,000 fires occur annually on the national forests. Forty-one percent of these are caused by lightning and 59 percent are man-caused. One major part of the problem is to so influence people living on, using, and visiting the national forests that the number of man-caused fires is cut to the irreducible minimum. The deep-rooted tradition that timber is an obstacle to tillage and should be removed by every means must be transformed into an understanding and respect for the contribution timberland can make to the national economy if destruction by fire, particularly destruction of the young growth, is prevented. Both human carelessness and intentional burning are involved. Human use of the national forests has increased rapidly and will continue to do so.

While fire danger and the necessity for protection expenditures vary widely according to differences in timber, brush, and vegetative cover, the fires that start must be extinguished as promptly and quickly as possible. To the extent that this is not done the practice of sustained yield forestry, wild-land management, recreational use, water conservation, and flood prevention is defeated. Presuppression is the term used to cover all organization and expenditures for detection of fires and everything done by way of advance preparedness to suppress those fires that do occur.

Fire fighting, or fire suppression as it is called, has many characteristics in common with war. During the middle third of July 1940, 1,347 fires, nearly all lightning-caused, were handled on the forests of the Northern Region of the Forest Service with a loss of only about 7,000 acres. Over 8,000 men from nearby and some remote sources of labor supply were hired, mobilized, transported, provided with tools and equipment, and subsisted on these fires. One single forest had 437 fires during this 10-day period. The magnitude and success of this operation for this 10-day period surpasses all previous records for the entire history of the national forests, but comparable situations of somewhat less magnitude and less success occur somewhere on the national forests nearly every year, and in many places during exceptionally bad years. In this region 2,722 fires were handled between January 1 and July 31, 1940, at an average cost per fire of \$169, against a cost of \$990 per fire for the 1,247 fires handled by the same region in 1934--the last year of comparable severity. The uncertain and precarious nature of fire suppression is illustrated by the fact that after this extraordinary performance this same region had one single hang-over lightning fire starting August 11, 1940, which burned more area than all of the 1,347 fires during the middle third of July and for several days threatened to become one of our 100,000-acre "historic" fires. It is obvious that successful management of fire suppression and the closely related activities of presuppression and prevention calls for highly developed technology, unusual application of management principles, much experimental work, and painstaking development of practice and traditions.

Significance: Without reasonably effective forest fire control large areas would be reduced temporarily or permanently to desert conditions. The yield of useful commodities and services from other large areas would be reduced to some fraction of the potential yield, floods would be aggravated, water supplies curtailed, and recreational uses impaired or destroyed. Although fire danger, physical conditions, and values at stake occur in widely varying patterns, the general statement can be made that effective fire control is the first step in obtaining from wild land the benefits society needs from such resources.

Plan of Work: Forest fire control must necessarily be planned to fit each area involved. Such planning and replanning has been going on for 30 years. The elements involved include structures for detection--"houses" or "cabs" on towers or mountain peaks at locations selected by means of special techniques; communication systems, telephone and radio; transportation, including road and trail systems, horses and mule transportation, use of motor vehicles, aircraft, freight and man parachutes, etc.; equipment and machines, including many special forms gradually developed for various fire control purposes; schemes of organizing and utilizing human resources, including influences to promote habits of fire safety; organization of cooperative forces; organization, management, training, and discipline of some 10,000 seasonal employees who contribute to fire control in varying ways and degrees; and systems of management for the suppression of fires, ranging from the thousands of "one-man" fires to those requiring a temporary labor force of 2,000 or more men adequately overheaded by hundreds of quickly assembled forest officers, experienced, trained, and expert in various functions. Planning of fire control is a continuing process of constantly increasing complexity and effectiveness.

Project 4. Control of tree-destroying insects and rodents on national forests;

Objective: To protect national forest timber stands and ranges from epidemic attacks of destructive insects and rodents.

The Problem: Particularly in the extensive virgin coniferous stands in western national forests, native tree-destroying insects (chiefly bark beetles) periodically increase in numbers to epidemic proportions. In order to protect the forests, epidemic insect attacks must be recognized and control measures must be applied promptly.

Significance: Native forest insects normally kill a considerable volume of timber in scattered trees each year on the national forests. These normal losses are widespread and usually do not seriously decrease the available volume of timber. The populations of tree-killing insects build up, however, to epidemic proportions in mature timber when climatic conditions are favorable. Studies by the Bureau

of Entomology and Plant Quarantine show that bark beetles alone destroy from one billion to five billion board feet of mature timber annually in western coniferous forests. This represents a huge loss in timber stumpage values, in potential wages to woods workers, and in lumber for industries. Fire hazards are also seriously increased by the presence of quantities of dead and dying timber in the stands.

Much of the timber in the western national forests is extremely susceptible to bark beetle attacks because of the fact that it occurs in large bodies of mature trees. Orderly utilization of this resource, with consequent furnishing of opportunities for labor and raw materials for industry, demands that insect epidemics be checked before serious timber losses occur.

Plan and Progress of Work: Measures for the control of tree-killing insects have been developed by the Bureau of Entomology and Plant Quarantine. In close cooperation with that Bureau, the Forest Service applies these methods in the national forests.

Since the work is always of an emergency nature--that is, the treatment of serious out-breaks as they occur--the location and prosecution of annual insect control jobs cannot be planned and programmed as accurately and definitely as can some activities. Each year susceptible areas are investigated. If there are indications of serious increases of insect activity, more detailed surveys are made by, or in cooperation with, the Bureau of Entomology and Plant Quarantine. Control operations are undertaken on specific areas after recommendation by that Bureau. The usual method of bark beetle control is to cut the trees and burn the infested bark, thus destroying the immature insects before they can emerge and attack other trees. Other methods, such as the application of penetrating insect destroying sprays and the spraying with oil and burning of standing trees, are used when conditions warrant. The work is frequently in remote localities, where camps must be serviced by pack train. It is highly seasonal, since there is a limited period during which it is possible to work in many localities and during which the immature insects are in condition so that populations may be greatly reduced by control measures.

Full advantage is taken of the availability of CCC and other emergency labor, but epidemics often occur in areas where such crews cannot be used. Furthermore, where they can be used supplemental competent trainers and overhead are necessary.

Project 5. Timber and forest products sales, free and administrative use, timber surveys, management plans, and timber stand improvement:

Objective: To utilize the national forest timber which is ready for cutting in such ways as will aid in stabilizing employment and industries, and to improve the quality and yield of future timber crops on the national forests to make them of greater usefulness and value.

The Problem: In the Lake States, the Northeast, and the South, organization of recently acquired national forests has progressed to the extent that much more timber is available for cutting than was the case a few years ago. In these regions and in the West local industries formerly operating on privately-owned timber are now turning to the managed public forests for supplies of raw material. Before timber sales can be made much work is necessary on inventorying available timber supplies, developing timber management plans, and appraising specific areas for sale.

Opportunities are also increasing for the improvement of timber stands through free use, granted to local residents, of dead, down, and defective material. This use, which is desirable from the standpoint of forest management and essential to the well-being of thousands of people who live within and adjacent to the national forests, cannot be adequately increased without personnel to handle the business.

Not all the needed timber stand improvement, however, can be accomplished by sale or free use. On commercially available sites suited to high quality timber production, small expenditures during the early life of the stand to remove "forest weeds", thin overly dense reproduction, or to prune "crop trees" results in materially increasing its ultimate value. The problem is analogous to that of caring for a farm crop in order to improve its quality and yield.

Significance: National forest timber sales numbered 27,512 in the fiscal year 1940. They varied in size from \$5 worth of timber to supply the needs of an individual settler to long-term sales on which as much as eighty million feet were cut per annum, supplying the raw material for manufacturing plants supporting communities of 3,000 or more people. Although the chief product is sawlogs, many others such as corral poles, fence posts, cordwood, shingle bolts, Christmas trees, and gum for naval stores are sold.

The operations of logging and milling (exclusive of lumber transportation and remanufacture) are conservatively estimated to furnish three man-days of work for each thousand board feet cut. On this basis, the fiscal year 1940 cut furnished 5,220,000 man-days of work, or, at 250 working days per year, 20,880 man-years. This is equivalent to the support of more than 20,000 families.

Timber stand improvement work is a basic step in converting wild forests to managed forests, by which the natural process of thinning and the reduction of the numbers of undesirable trees can be materially speeded. In some species the grade of lumber is increased by pruning lower persistent branches.

Plan and Progress of Work: Timber management plans are prepared for individual working circles on the national forests, so that the timber crops may be harvested as they mature and so that the production of each working circle may be integrated with the needs of local industries for raw material. In order to make intelligent plans, in-

ventories of timber resources must be conducted, as well as studies of growth and mortality. Methods of cutting must be adapted to local conditions and local possibilities of marketing various products. Thus, timber management plans are basic to the orderly harvesting of national forest timber crops. Timber cruising and the preparation of management plans is an important and continuing job on the national forests. Each plan is reviewed and revised at intervals so that it may be kept up to date.

Under the cutting budget set up in the management plan, timber is offered for sale as it is ready for cutting and as it is needed by local industries. Each timber sale requires a detailed appraisal of the amount and value of the stumpage offered for sale. In connection with these appraisals, the officers doing the work must keep currently informed on timber operating costs and lumber selling prices.

In the tabulation below the progress of cutting on the national forests for the past three years is shown by broad geographic regions. The limitation of cut, which is based upon the supplies of merchantable timber now standing on the national forests and the ability of the land to grow future supplies, is also shown.

Timber Cut on National Forests, by
Geographic Regions
(Figures shown are thousands of board feet)

Regions	Limitation of cut	Actually cut (commercial and cost sales and land exchanges)		
		1938	1939	1940
Pacific Coast				
Pacific Coast	4,784,620	663,071	748,547	1,002,449
Rocky Mountain States	1,307,900	451,306	382,165	463,799
Lake States and Northeast.....	279,500	84,810	65,111	120,534
South	207,000	88,730	94,738	153,489
Total	6,579,020	1,287,917	1,290,561	1,740,271

In 1933, the total cut of national forest timber was 473,922 thousand board feet. In 1940, it was 1,740,271 thousand board feet--four times as large as in 1933. In 1933, cash receipts to the Treasury from timber sales were \$782,808, while in fiscal year 1940 timber sale receipts amounted to \$3,943,023. In addition, in 1940, \$981,901 worth of national forest timber was cut in exchanges for land.

The administration of timber sales includes marking the trees to be cut, supervising the cutting to make sure that it is done in accordance with the requirements of the timber sale agreement, and scaling the logs or other products as a basis for payment for the timber.

Studies are also made of cutover areas to determine the residual volume and its condition. These data, after being compiled and analyzed, are used to supplement timber management plans, so as to check and revise data relative to growth and future cuts.

In addition to timber cut on commercial sales and that which is cut in exchange for land, local settlers are entitled to purchase timber for personal use at the cost of making the sales. This business, which amounted to 23,768 thousand board feet in the fiscal year 1940, is of vital importance to thousands of local residents within and adjacent to the national forests.

Of great importance also, in connection with reduction of fire hazard and the accomplishment of timber stand improvement, is the timber which is granted free of charge to local residents. In the fiscal year 1940, 324,900 thousand board feet, estimated to be worth \$299,923, was so granted from the national forests.

Of the 27,512 timber sales made during fiscal year 1940, 25,037 were in amounts of \$500 or less. Sales of this character are handled by the district forest rangers and their assistants. They are of great importance to the numerous small timber operators, many of whom work in "family-size units", in which the head of the family, together with his sons and relatives, operates a small sawmill or handles a logging job, selling the products to an established manufacturing plant. Larger sales are administered by timber-sale rangers, usually resident on the sale area and occupied full time with the details of marking, timber sale administration, and scaling.

In addition to timber sales and free use, forest cultural work is needed in stands so young that usable products are not cut. Since 1933, 2,700,000 acres of national forest land has been covered by timber stand improvement operations, including thinning of commercial species, pruning of valuable "crop trees", and release from undesirable competition. Practically all this work has been accomplished by CCC, Emergency Relief, and other emergency funds, with the needed planning and supervision of members of the permanent force.

Project 6. Allocation and issuance of grazing permits, supervision of range use by domestic livestock, range surveys, and range management plans on national forests;

Objective: To maintain and improve the national-forest grazing resource, and to continue grazing use as an important part of the support of communities in the range States to the largest practicable extent consistent with conserving vegetative cover in its important watershed and erosion relations and with other uses of the national forests.

The Problem: Grazing on the national forests ranks high among the uses of the forests for other purposes, such as timber, water, wildlife, and recreation. The correlation of different uses and the determin-

ation and allocation of priorities on 86 million acres (50 percent of the entire national-forest area) calls for continued planning, local supervision, and the general application progressively of improved knowledge and better practices in range and livestock management.

Significance: Large social and economic considerations to about 35,000 grazing users and their families and to the communities and States in which they reside are involved. The national forests provide mostly summer range which is indispensable in the year-round conduct of the livestock pursuits of those who depend upon the mountain ranges and in the social and economic fabric of the range States. It is important that the resource be so managed as to foster this need to the fullest extent consistent with the protection of the range and related resources.

Revenues: For the fiscal year 1939 the national-forest grazing receipts were some \$1,573,900, thus showing a substantial return to the Government. Fees are charged on a per capita per month basis. The rates are based each year on the livestock markets of the previous year and thus vary somewhat from year to year according to market conditions. The average per capita charge for 1939 was 13.4 cents per month for cattle and 3.3 cents per month for sheep. The average fees for 1940 are 14.89 cents per head per month for cattle and 3.68 cents per head per month for sheep.

Improved market conditions are reflected in increased rates and total fees the following year, and the reverse obtains when markets for the previous year are lower. Revenues from grazing uses of the national forests from 1906 to 1939, inclusive, have totaled \$49,783,603, grazing receipts ranking next to receipts from timber sales in the sale of national-forest resources.

Plan of Work: Work carried on under this activity is both administrative and technical. The competition has been very keen for the use of these ranges and this has increased the responsibility of the range manager and the demands upon his time.

The more detailed work in this field consists of the handling of some 25,000 grazing applications plus 10,000 no-charge permits, stock counting, inspections to determine range readiness and to see that management on different units of range is installed and carried out during the grazing season, studies of those uses in relation to local capacities, supervision of the construction of improvements, such as fences, water development, stock bridges, stock driveways and trails, eradication of poisonous and obnoxious plants, investigation and handling of complaints and appeals, meetings with stockmen and advisory boards, preparation of annual and special reports, development and current revision of unit management plans, and the periodic recording of scientific information on observation plots and plant development stations to show the progressive effects of range utilization.

Range administration also includes conducting range surveys, which work, including aerial surveys, should be expanded until all the important grazing lands are covered. During 1939 approximately 2,800,000 acres were surveyed, bringing the total of such lands covered to nearly 53-1/2 million acres.

Project 7. Protection of wildlife resource, preservation of forest conditions conducive to the propagation of wildlife, reduction in number of game animals in overstocked areas, wildlife surveys and management plans:

Objective: (1) To integrate fish and game management with the management of other national-forest resources; (2) correlate fish and game development and uses with social and economic needs; (3) to provide and maintain suitable environment to the extent practicable; (4) establish and maintain fish and game populations consistent with the means for their support and other uses of the national forests; (5) cooperate with State, Federal, and other interested agencies; (6) obtain fish and game utilization on a sustained-yield basis.

The Problem: Fish and game are recognized as major products of national forests, requiring the practical application of accepted methods of wildlife husbandry. Competitive demands for the same range by game and domestic livestock, leading to overgrazing and erosion, are increasingly difficult to handle. Many of the complexities of management are of human origin, requiring the application of management through the regular democratic processes of government. Public relations are therefore largely concerned in the management job in its various relations to other resources and uses.

Significance: Big game animals, estimated in 1939 to number 1,920,000, have shown an increase above hunting take of 180 percent since 1924. Populations have doubled each ten years since 1908. In the West, 75 percent of all big game are dependent on the national forests. Furbearers are broadly estimated at 4,340,000 animals of different species, and unestimated numbers of game and nongame birds also find favorable habitat. Fish life may be visualized in more than 70,000 miles of trout streams and many thousands of natural and artificial lakes stocked with or suitable for game fish.

Revenues: Revenues are mostly indirect, accruing to States and local communities and individuals but representing values on the national forests in licenses and other hunting and fishing expenditures, fish and game take, etc., in excess of \$100,000,000 annually, or fully one-tenth of such values for the country as a whole. These indirect values and benefits will increase.

Plan of Work: Work under this project consists of obtaining control over numbers and distribution of game using the national forests; cooperation currently with various Federal, State, sportsmen, and other agencies; cooperation in the enforcement of State and Federal

game laws; examination of licenses, also their issuance in remote places where the public cannot be adequately served by the regular license-selling agencies; giving information to the public about game laws and wildlife; requisitioning and planting nearly 300,000,000 fish annually; posting refuges and other protected areas; capturing and transplanting beaver, deer, and other species; assistance in predatory animal and rodent control; collection of statistical information on numbers of animals and birds and numbers killed by man and predators; development of stream and lake-stocking plans; game surveys of various kinds; supervision and construction of wildlife improvements; winter observations on range adequacy and local winter problems; studies of forage requirements; assistance in emergency feeding during critical periods; correlation of wildlife and domestic livestock, recreational, timber, and other uses; studies of overpopulations, public hunts, and checking stations; development of game and fish management plans; and preparation of comprehensive annual reports.

Project 8. Supervision of recreational use of national forests, including plans, operating, policing, enforcing State sanitary laws, and garbage disposal on public camp grounds:

Objective: To make the recreational resources of the national forests available to the public to the greatest practicable extent consistent with an overall plan and policy of coordinated development and use of all national forest resources for the maximum public benefit.

The Problem: The use of the national forests for recreation has reached huge proportions and is still growing. It requires careful planning to make suitable provision for this use, the administration of both dispersed and concentrated use, involving over 4 thousand developed areas, and the provision of additional areas to keep step with the demand. As a minimum, it is necessary to protect the forests from damage and to regulate public use so that it will not menace other resources and public health and safety. Careful planning is necessary in order to insure that national forest lands will be allocated to their highest use.

The problem is further complicated by the rapidly expanding list of public tastes. For instance, several years ago winter sports began to boom and have been increasing by leaps and bounds since then. The Forest Service, in accordance with insistent public demand, provided ski areas, shelters, sanitation, and parking facilities and permitted private development of ski tows and lifts on these areas.

Significance: During 1939, over 11 million visits were made to the national forests for the purpose of using the recreational areas, and in addition some 3 million stayed at resorts and summer homes in the forests, and more than 20 million other visits were made by motorists to enjoy the scenery.

The public comes to the national forests for camping, picnicking, swimming, skiing, fishing, hunting, hiking. Some come for a few hours, others for weeks. Some are local people who use a certain forest or area repeatedly, others are on vacation and are traveling far from home. Some want to camp with their own outfit; others want resorts and hotels. There are also groups or organizations such as the Boy Scouts, Girl Scouts, 4-H Clubs, and various groups who facilitate vacations for the underprivileged, and want moderate-cost accommodations under roof for 50 to 100 or more.

Studies in 1937 show that 71 percent of those using national forest campgrounds are in the low-income class--below \$2,000 a year--so the national forests are particularly serving the public need for low-cost vacations.

If the recreational uses were permitted promiscuously on the national forests, they would create a tremendous fire-protection and sanitation problem. Damage to the property would occur and streams used for domestic water would be polluted so as to be a menace to public health. Furthermore, the most accessible spots would very soon become hopelessly worn out--ground cover destroyed, timber growth damaged, and erosion encouraged. In order to meet this public recreation demand and to prevent forest fires as a result thereof, the Forest Service has established over 4 thousand camp and picnic grounds and several hundred winter sports areas, has built 25 organization camps, installed other simple facilities, and established 76 Wilderness and Wild Areas. In addition, the Forest Service has permitted private persons to construct resorts needed by the public, organization camps, and summer homes on forest lands not needed for more public purposes.

These established recreation areas include such improvements as sanitary and water systems, parking areas, tables, stoves, shelters, roads and trails, swimming facilities, ski trails, and ski slopes. These improvements must be kept clean, safe, and well maintained. Campgrounds and similar areas must be supervised to insure careful and orderly use and to provide refuse disposal.

In addition, the supervision of semi-public and private recreation improvements requires attention. All permits provide for the protection of the Government and the public.

Plan and Progress of Work: With the help of emergency funds the planning and development of recreational areas has progressed very satisfactorily during the past 7 years, but some additional developments will be needed to care for the annual increases in use. However, administration of existing recreational areas has not kept pace with developments.

Project 9. Land-use management on the national forests, including rental of land; land classification; action on claims entered under public land laws; location and posting of national forest boundaries; general surveys, plans, and maps; aerial photography; land exchange:

Objective: (1) To allow private uses of public lands and collect suitable fees in accordance with sound land management principles; (2) to limit the entry of agricultural and mineral lands to the provisions of the Acts of Congress authorizing them; (3) to secure maps, adequate in scale, accuracy, and detail and needed for forest administration, through utilizing surveys made by other agencies and by the Forest Service; to make project and similar surveys and maps for planning extensions or improvements in forest protection and utilization; (4) to obtain aerial photographs of satisfactory scale and accuracy covering all national forest areas and other areas administered by the Forest Service; such coverage will greatly aid in more efficient administration; protection, and development activities; (5) by markings on the ground, to properly identify Government-owned land in the national forests; (6) to consolidate Government-owned land through land and timber exchange.

Problem:

- (1) Special permits are granted for such diverse use of national forest lands as apiaries, cultivation, summer homes, resorts, airports, pastures, roads, diversion ditches, school houses, cemeteries, and many others. The permitting of such uses involves the selection and allocation of suitable areas and sufficient supervision to protect the public interest. The demands for special-use permits, particularly summer home sites, necessitate the preparation of general plans to make certain that general public use is not subordinated to limited private use.
- (2) Although all national forest lands suitable for agriculture have been classified according to the Act of August 10, 1912 (37 Stat. 287), and most of those classified have been entered under the Act of June 11, 1906, it is still necessary to handle numerous appeals from persons who believe that the Secretary's classification is erroneous.

The occupancy and development of land under the mining laws is a constant source of administrative trouble. Frequent cases arise where persons attempt to make unlawful use of mineral claims or try to get title to nonmineral land under the mining laws.

- (3) The Forest Service is not a primary mapping agency but is a very large user of maps. Maps are needed for laying out, designing, or planning transportation, detection, and communication systems, recreation areas, special uses, nurseries, plantations, grazing allotments, administrative stations, property ownership, and many other purposes.

Maps and other data prepared by Federal, State, and other agencies, while fully utilized, fail to meet the specialized needs of the Forest Service. The mapping project includes the recombination of existing maps, with changes in scale where necessary and with the addition of detail as the map users require. Project surveys and maps, usually on a large scale, are needed for a single purpose or resource.

- (4) For efficient administration knowledge of the location, amount, condition, and value of the different resources and of their relationship to other resources and to other utilization of the land is essential. Maps of satisfactory scale and accuracy contain much of the essential data. In the past the deficiencies have been met by traditional administrative tools such as the special investigation and report, extensive and intensive reconnaissances, photographs, general knowledge, etc. The results are frequently satisfactory, and to that extent these methods will be utilized until a better method is found. But very largely the results have been unsatisfactory from standpoints of accuracy, completeness, reliability, or cost.

The experience of the Forest Service and other bureaus, notably the Soil Conservation Service and the Agricultural Adjustment Administration, has shown conclusively that recent advances in aerial photographic operations have largely made obsolete many methods used in the past. The aerial photographs have made possible changes in past methods which in turn have resulted in more accurate and complete data and in a material reduction in the cost of acquiring data needed for planning of land use and for the protection, development, and utilization of resources, separately or in combination with other uses. Furthermore, at relatively small additional expenditure, the photographs may be utilized in making planimetric maps.

- (5) The marking on the ground of both the exterior and interior boundaries of the national forest land is necessary for administration. For the exterior boundaries, the markings of the General Land Office may largely suffice except for intersections with roads, trails, and similar facilities. In other States, marking the exterior boundaries is needed. In all States, the intersections of forest land with alienated or private land inside the forest boundaries and with roads must be marked.
- (6) Lands offered for exchange by private owners within national forest and purchase unit boundaries are appraised and exchanged for publicly owned land or timber where such exchange will be in the interest of the government.

Significance:

- (1) During the past year 6,870 permits were issued to persons applying for special use of small areas of the national forests. This demand requires that individual consideration be given each

case, in order that the public may be properly served and the Government's investment in the areas used protected. Thousands of impoverished families, who were tenants on land in the eastern and southern regions, remain as special-use permittees. They are rehabilitated to the extent possible by improvement of their housing conditions and employment on the national forests.

- (2) Each application for homestead and mineral entry must be considered as a separate problem to determine whether the intent of Congress is being carried out. The total of both classes received last year was 171.
- (3) The recent increased and more intensive utilization of the older forests and the large addition of new forest areas have greatly increased the number and kinds of maps used and the need for maps of larger scale, higher accuracy, and greater detail. More accurate locations of cultural, drainage, and topographic features are required. Base maps are essential to the administration of all forms and kinds of resources and for their protection and utilization.
- (4) Among the activities where the photographs have been or can be economically used are fire detection and suppression, range surveys and management, timber reconnaissance surveys, erosion surveys, land and water use and resource surveys, location of land lines, selection and revision in unit boundaries, drainage studies, transportation planning, road and trail reconnaissance, and recreational planning.
- (5) Boundary marking between national forest and private land serves to prevent the illegal cutting of Government-owned timber and of other trespass. These markings also establish the locations covered in timber, grazing, and other Government-issued permits, thereby protecting adjacent land owners from trespass or encroachment by forest users. For the exterior boundaries, the marking or posting of over 70,000 miles is involved.
- (6) Landowners within prescribed national forest or purchase unit boundaries frequently apply for exchange of land in order to consolidate their holdings. Where exchanges are in the interest of better administration of the national forests such exchanges are consummated.

Plan and Progress of Work:

- (1) The Forest Service has in force 42,323 special-use permits (23,075 paid and 19,248 free) covering 1,783,242 acres of public land, and 19,542 permits covering telephone lines, railroads, roads, and drift fences. Six thousand eight hundred and seventy of these permits were issued and 5,637 were abandoned or transferred during the past year. Of the total, 1,371 are semi-public special uses, such as resorts, service areas, and organization camps, which require more than ordinary supervision to assure the public of adequate service at reasonable rates.

- (2) During the past year examinations and reports were made on 79 homestead claims. Nine hearings were held, 77 new claims were received, 33 were pending from the previous year, and 31 were carried over to this year. In the same period examination and report was made on 100 mineral claims; 7 hearings were held, 94 new claims were received, 88 were pending from the previous year, and 82 were carried over to this year.
- (3) With the usual appropriation, little progress can be made through the medium of ground surveys and usual map compilation methods. Fortunately, means of using single-lens aerial photographs have been found. The photographing of only a small proportion of the forest area has been financed from Forest Service appropriations, but a considerable number of photographs have been taken by the Agricultural Adjustment Administration and the Soil Conservation Service for their own specialized work within national forest boundaries. The primary purpose of such photographs is for resource planning, use, and control, and the action necessary for such purpose will not result in a forest base map. The results of such action, however, can be utilized very effectively in map making. Such utilization has demonstrated conclusively that planimetric maps of a high degree of accuracy can be secured and the cost greatly reduced, larger-scale maps being secured for the same expenditure as for maps on much smaller scales where ground survey methods were used. Ground methods must still be employed for horizontal and vertical control, for adding contours to planimetric maps and also for project surveys where a large scale and intensive study are required.
- (4) Photographic coverage is needed for the gross area of about 229,000,000 acres in national forests, purchase units, experiment stations, and land-utilization areas. By utilizing Forest Service appropriations and more particularly because of SCS and AAA photographs within the forest areas, photographs are now available for about one-fourth of the forest area. Unfortunately, many of these photographs were taken on too small a scale and at a time when the science of aerial photography had been inadequately developed. For such unsatisfactory photographs new ones are needed.
- (5) The total amount of required boundary marking has been increased within the past few years through the new areas added to the forests. Marking of exterior boundaries has been executed as necessary. Much marking of interior boundaries and of intersections with such as roads and trails remains to be done. Maintenance of monuments, signs, or other forms of markers is a recurring activity handled annually by each field unit.
- (6) During the fiscal year 1940, 166 exchange cases were approved and submitted to the Secretary of the Interior. The Government received 414,660 acres, appraised at \$2,230,251, in exchange for 14,186 acres, valued at \$27,187, and \$1,924,741 worth of national forest stumpage.

Project 10. Protection, development, and management of the water resources of the national forests:

General: This project contemplates the establishment and maintenance of satisfactory watershed conditions on the national forests (including the integration of all activities), in order to correct and minimize man-caused erosion, reduce excessive run-off in aid of flood control, and produce maximum quantities of usable water.

Objective: To make that part of the water resource originating on the national forests as fully productive and of as great service, under the multiple-use principle, as it needs to be to meet national requirements.

Problem: National reconnaissance surveys have indicated that some degree of erosion due to man's disturbance of natural conditions is to be found on slightly more than one billion acres. Preliminary indications are that several million of these acres are within the national forests. This condition on the national forests is due, for the most part, to acquisition of land in the east and south after erosion had been started by destructive agricultural practices and cropping of essentially non-agricultural land, and to a lesser extent in the west where grazing and other uses, due to the limited opportunity for observation, have not in all cases been entirely consistent with the present water-conservation policy. With the eroded areas outside the national forests, these areas contribute to the depreciation of soil values, obstruction of navigation, increase in frequency and magnitude of flood damage, and siltation of reservoirs.

Under the leadership of the National Resources Planning Board, the Forest Service cooperates in planning and executing the Department's upstream flood control program. Water management will lead to more effective control of the uses which disturb ground cover conditions.

Significance: National Forest watersheds supply water in significant proportions to more than 400 municipalities, aggregating over five million in population and including such cities as Denver, Los Angeles, Salt Lake City, and Portland. At least 85 percent of the irrigation water used in the West has its origin in National Forest watersheds. Thirty-two percent of the water power resources of the eleven Western States is within the National Forests. Recognition of these conditions and integration of all uses on these watersheds is important to maintain the water supply needed for domestic, agricultural, and industrial uses.

The extent of areas in the Southern States acquired for National Forest use after accelerated erosion had taken place is now being determined. Return of these areas to a productive condition through erosion control is essential to complete forest management and the protection of agricultural land below them.

Plan and Progress of Work: Primary emphasis is now being placed on erosion control on the national forests. Prior to 1933 little emphasis was placed on water management, since it was considered a natural resultant of sound forest and range management. Subsequent additions of area and increased public demands make it a component of other forms of management. Techniques have been and are being developed by the forest and range experiment stations and by the field administrative organization, particularly through use of the Civilian Conservation Corps. Between April 1935 and July 1938 CCC work on erosion control has amounted to 468,000 man-days and on flood control to 303,000 man-days. An undetermined amount of erosion control has been accomplished by forest planting and by careful road location, construction, and road bank fixation.

It is expected that the inventory of erosion problem areas initiated in 1939 will be completed in 1941. Data obtained in the Rocky Mountain region are now being used to adjust grazing use to water conservation.

Snow surveys are undertaken annually in the high watersheds of nearly all the major western rivers. The survey data and water supply forecasts are issued by the Soil Conservation Service. The collection of field data is a cooperative undertaking to which national forest personnel regularly makes major contribution by supplying the data for the national forests.

The action phase of the Department's upstream program for waterflow retardation and soil-erosion prevention is now ready for initiation. The first project, a two-year operation in the Los Angeles River drainage, contemplates an expenditure of \$1,170,500 by the Forest Service within the Angeles National Forest. Of thirty-five surveys in various degrees of completion, nineteen directly involve National Forest land. Survey reports upon four project areas involving National Forest lands have been submitted by the field organization with recommendations for action programs within National Forests.

Intensive management of the vegetal cover in forested watersheds to affect the volume or to regulate the distribution of water supplies is in the investigative stage. Research basic to such management is being conducted by the Forest and Range Experiment Stations through the Division of Forest Influences. It is a long-term undertaking.

Conservative management of forested watersheds is being applied to create and maintain conditions of cover known to be generally conducive to beneficial conditions of waterflow. The necessity for maintaining forests for protection of watersheds is recognized in timber management plans, uses are restricted in municipal watersheds, and cooperative protection is being accomplished in a slowly increasing number of watersheds through agreements with municipalities. A listing of the uses and forest resources within municipal watersheds in

National Forests and an estimate of potential uses has been made. The information is of continuing value in the development of land-use plans. Plans contemplate furnishing the leadership required to carry on this work with emergency funds or with an allotment from the Flood Control appropriation and the adjustment of other activities as indicated as necessary to satisfactory water management.

Project 11. Construction of improvements other than roads and trails.
(Includes telephone lines, fences, lookout towers and observatories, firebreaks, offices, barns, garages, dwellings, outhouses, water developments, pipe lines, public camp grounds, landing fields, etc.)

Objective: To construct the improvements (other than roads and trails) necessary for the protection and administration of the national forests and the utilization of national forest resources.

Problem: Most of the national forests are located in the mountainous Regions of the country, largely undeveloped and inaccessible. To facilitate their administration and protection it is necessary to equip them with various classes of improvements, as follows: Telephone lines for fire control in localities where commercial systems are not available; lookout cabins on mountain peaks to house men and instruments, properly located to discover lightning and other fires and to transmit the alarm; lookout towers, where the topography does not provide a natural elevation sharp enough to command the necessary view; dwellings, barns, and other structures necessary to provide quarters for men and animals, who must be stationed remote from any settlement or rentable quarters; simple office structures for housing records and transacting business required in administrative or fire-control work; fences to prevent the trespass of unpermitted stock or to control the drift of permitted stock in order to secure the best utilization of the National Forest ranges; water improvements in the form of developed springs and wells, pipe lines, and other works required at ranger and other stations, or for watering livestock on the forest ranges, or for public campgrounds; and other campground improvements designed to protect the forests, maintain sanitary conditions, and facilitate public recreational enjoyment of the forests by providing simple structures, etc.

There are also required certain improvements of a nonstructural nature, such as permanent firebreaks and lanes placed in strategic locations to facilitate holding fires that escape from the initial efforts to control them; the clearing of debris and fallen timber along roadsides to reduce the fire hazard; the improvement and cleaning of fishing streams; and soil-erosion work.

Significance: The construction of well-planned and well-located improvements facilitates the administration and protection of the national forests and the proper utilization of their resources. For example, the construction of a lookout tower on a mountain peak from which a lookout man can keep areas of the national forests under observation, which would otherwise not be visible from any other observation point,

may result in the saving of thousands of dollars in fire suppression costs. Other improvements such as telephone lines, guard cabins, firebreaks, landing fields, and the installation of recreational areas on which to concentrate forest visitors play an extremely important part in the fire control program on the national forests.

Administrative improvements facilitate all phases of national forest work, and they are absolutely essential in remote locations where it is impossible to obtain suitable rentable housing, office, storage, and other facilities.

Range improvements facilitate the management of stock on the ranges, reduce recurrent expenditures in connection with the supervision of the utilization of forage by domestic stock, eliminate controversies over the use of specific areas by national forest permittees, make possible the utilization of the forage resource in areas which would not otherwise be utilized, aid in revegetation of depleted ranges and make feasible the attainment of grazing management objectives.

The recreational improvements serve the double purpose of enabling the public to enjoy the recreational resources of the national forests under healthful and sanitary conditions and of protecting the national forests from fire through the concentration of recreational visitors on "fire-proofed" areas. Public pressure on the forests has built up the annual use on these areas to tremendous proportions. In return, the outdoor recreation furnished through these forest areas has made substantial contributions to permanent social and economic betterment.

Plan and Progress of Work: Each National Forest has an improvement plan which is carefully reviewed by the regional office staff and coordinated with the plans of neighboring National Forests, as well as with all-service objectives. Priorities for the use of regular funds in the construction of designated improvements are carefully worked out.

During the past seven years a large number of improvement projects have been constructed on the National Forests through the use of Civilian Conservation Corps (CCC) and Works Progress Administration (WPA) funds. However, the allocation of camps under the CCC program and of funds under the WPA programs are based primarily on population. Under these conditions the National Forests in the sparsely settled Western States have been unable to obtain the allocation of camps and allotments with which to construct many of the improvements necessary for the protection, management, and utilization of the National Forests. Aside from the shortage of emergency funds on the western national forests, the restrictions imposed under the emergency programs have made it impossible to construct many high-priority improvement projects on the National Forests. The same situation applies on the eastern forests but to a lesser degree.

There are, therefore, a great many high-priority improvement projects which cannot be undertaken with regular or emergency appropriations. Providing a program of construction is initiated to bring the planned system of general administrative improvements to satisfactory standard, it will contribute substantially to employment possibilities over the Nation as well as solving pressing management problems.

Project 12. Reforestation and revegetation of denuded national forest areas:

Objective: To restore to productivity and usefulness areas of present National Forest land which have been devastated by fire, unregulated cutting, or unwise range or agricultural use, and which are now unproductive and in some cases are seriously eroding. While in such a condition they add to the danger of destructive floods.

The Problem: The Western National Forests include hundreds of thousands of acres of land which has been devastated by fire and seriously depleted by heavy grazing of domestic livestock. Much of this extensive area was damaged before the creation of the national forests. With the increasing effectiveness of fire control, only comparatively small areas of productive timberlands are burned annually, and only in exceptionally bad fire years is much land added to the planting problem because of fires. Many areas which are denuded by severe fires restock naturally. In the West, also, sizable areas are being acquired in a cut-over, burned, and overgrazed condition. These frequently include some of the better timber-growing sites which, because of past abuse, must be planted in order to make them again productive. In the purchased forests of the Lake States, Northeast, and South, much land has been acquired and much yet remains to be acquired which is in denuded condition. Unregulated private cutting followed by repeated forest fires has removed all vestiges of timber growth of commercial species. These forests are in close proximity to the centers of population and demand for forest products, and here are the most urgent planting needs of the entire national forest system. Here is a combination of land which has the potentialities of producing good timber crops, large populations within and adjacent to the National Forests, dependent for a large part of their livelihood on work in the woods, and markets for lumber and other forest products. To allow such land to remain in an unproductive, idle condition is merely an aggravation of local problems of unemployment and excessive freight charges for the importation of raw materials to maintain local industries. The establishment of forest plantations on such land is the first step in changing idle lands to a productive status.

Significance: In the western National Forests the vegetative cover on a large area of formerly productive range land has been so badly depleted, and soil-fertility loss has been so great, that artificial revegetation is required to meet watershed protection needs. Careful estimates indicate that some 780,000 acres of national forest land require this type of treatment.

Although the total denuded area of forest land on the National Forests is much larger, careful surveys have shown that 3,169,000 acres need planting. Sixty percent of this area lies in the National Forests east of the Great Plains. Past abuse has changed the character of some sites which originally produced excellent stands of desirable timber species to the extent that reforestation is rather difficult and expensive. In some cases, as some lands in the Lake States, site conditions are now such that the original species cannot be reestablished artificially. For example, areas which originally produced good quality red pine have been so devastated that planting can succeed only if the less fastidious jack pine be used. Fortunately, however, there is a large and growing market for jack pine as pulpwood and, therefore, it is not only feasible but very desirable to accomplish reforestation with this species. In the South, the recent rapid expansion of the pulp and paper industry provides a ready market for pulpwood which may be cut from plantations, as thinnings, while the best formed trees may be left to grow into good quality saw timber.

Plantations also play an important part in watershed management in many sections of the country. Denuded mountain ranges in some sections of the West contribute to flash floods and periodic droughts, whereas, if successful forest plantations are established, flood waters will be retarded and a more even flow of water, vital to irrigation projects, will be assured.

Plan and Progress of Work: National Forest planting has been under way for more than 30 years. At present, 27 nurseries are operated in order to supply planting stock for the program. These nurseries produced 144,873,000 trees for planting in the calendar year 1939, as contrasted with the possible production, were each nursery fully utilized, of 256,900,000 trees. A basically important feature of the reforestation work is the collection of tree seed and the production of planting stock suitable for the individual areas to be reforested. In 1939, 112,000 bushels of coniferous cones were collected, in addition to 2,800 bushels of hardwood fruit and 28,500 bushels of seed of tropical species, which latter are used in the nurseries of Puerto Rico. In order to make sure that the planted trees will be satisfactory for the planting site, a great deal of care and attention is given to collecting seed from trees growing near the planting sites or under climatic conditions as close as possible to those of the planting sites.

Operation of forest tree nurseries involves intensive cultivation of relatively small areas. Forest Service nurseries range in size from less than 10 acres to about 100 acres. Close cooperation is maintained with the Bureaus of Plant Industry and Entomology and Plant Quarantine in the control of nursery diseases and insect pests.

Nursery stock is ready for shipment when from one to five years old, depending upon species and locality. One-year old stock is used almost exclusively in the South where climatic conditions are favorable for rapid tree growth and the older age classes are needed in regions of lower precipitation and slower growth rates. Planting stock is shipped from the nurseries to previously selected planting projects on the National Forests and the planting is accomplished by trained crews under competent supervision. The regular appropriation for National Forest planting is extremely inadequate, and by far the major portion (about 75 percent in the current year) of the expenditures for nursery and planting work comes from CCC and WPA funds. Most of the nursery labor and also the labor engaged in planting is recruited from these sources. In the calendar year 1939, 131,892 acres were planted on 86 National Forests. In addition, 3,959 acres on six National Forests were reforested by direct seeding. These compare with the accomplishment in 1938 of 154,993 acres of planting and 164 acres of direct seeding. The decrease is due to the decreasing availability of emergency labor and funds.

The National Forests now contain about 1,000,000 acres of plantations. This figure is net, after deducting losses from fires, droughts, and other causes. There are 3,000,000 acres which need to be planted and land of similar character is added annually by purchase and exchanges. The present program of about 130,000 acres annually is inadequate to finish the job in a reasonable time.

The cost of planting varies tremendously in different parts of the country due to topography and condition of the areas being planted, size of the individual planting jobs, and character and cost of the planting stock. Costs have been increasing for the past three years, due partly to the fact that greater attention is being given to culling nursery stock and discarding trees which research has shown are unsuited to planting, thus tending to improve survival and therefore lower the final cost per established tree. In addition, since most of the planting is done by CCC labor and since areas close to established camps have been planted, transportation cost of planters has risen. The cost per acre for National Forest planting during each of the past five years is as follows:

1935	\$11.74
1936	8.80
1937	10.00
1938	11.47
1939	12.66

Since the average number of trees planted per acre is about 1,000, it can be seen that reforestation is being accomplished at the very reasonable figure of about 1 cent a tree.

Project 13. Hazard reduction, fire preventions, and timber use, White Mountain National Forest:

Objective: To reduce the fire hazard and provide for emergency fire control necessitated by the disastrous hurricane of September 21, 1938, and to salvage the merchantable material killed.

The Problem: The hurricane resulted in severe windthrow of the timber on 90,000 acres of the total 700,000 acres of the White Mountain National Forest. It was in blocks of from 10 to 11,000 acres and was entangled to such an extent that an extraordinary fire hazard resulted. A similar condition existed on approximately 100,000 acres of private interior and adjoining holdings, which increased the hazard of fires originating on private land and spreading to Government owned property. Approximately 100,000,000 board feet of merchantable material was either blown down or root sprung in accessible areas and in enough volume per acre to present opportunity for commercial salvage operation.

Significance: This condition constituted a serious threat to the Government's investment in land and timber on the White Mountain National Forests. The unnatural condition resulting from large masses of down dead timber made the area susceptible to fires of disastrous size and severity, especially in view of the fact that approximately 3,000,000 recreational users visit the forest annually. Further, the merchantable timber represented a value that could be salvaged only by prompt action, since the natural process of returning the wood to the soil through attacks by insects and fungi begins immediately upon the death of a tree.

Plan and Progress: Although burning conditions will not return to normal until about 1952 when this process of decay will be virtually completed, the work accomplished under this project will make adequate protection of the forest possible from 1942 on, with a gradual decrease in the size of the protection organization and without further extraordinary expense in hazard reduction. The hazard has been reduced by removing all blowdown for a distance of 25 to 150 feet along 71 miles of forest roads and 957 miles of trails. Two hundred water pump sets have been constructed. Seven fire trucks have been fully equipped and the supply of hand fire-fighting tools augmented. On the larger areas of blowdown 125 miles of 25 to 150-foot firebreaks have been constructed.

The regular fire organization has been strengthened by the organization of special warden crews of local residents. These crews have received intensive training in fire suppression, as attested by the fact that, although numerous fires originated under trying conditions, all to date have been controlled before reaching damaging proportions.

As the basis for the salvage of usable material, reconnaissance was made of the national forest lands and the class of damage plotted on timber management type map overlays. Salvage has been handled by consummation of regular commercial timber sales. As of June 30, 1940, 70 percent of the 100,000,000 board feet of accessible merchantable material had been sold, and present indications are that the market will permit sale of the additional 30 percent early in fiscal year 1941.

SUPPLEMENTAL FUNDS

Direct Allotments

Projects	: :Obligated : 1940	: Estimated : obligations, : 1941
<u>Emergency Relief, Agriculture, Forest Service</u>	:	:
(Transfer from W.P.A.): For conservation of	:	:
forest resources, surveys and mapping, and	:	:
developments of campgrounds under "National	:	:
Forest Protection and Management" as follows:	:	:
Maintenance of improvements other than	:	:
roads and trails. (Includes telephone	:	:
lines, fences, lookout towers and ob-	:	:
servatories, fire breaks, offices, barns,	:	:
garages, dwellings, outhouses, water	:	:
developments, pipe lines, public camp	:	:
grounds, landing fields, etc.)	:\$ 430,113	:\$ 127,000
Forest fire control, including prevention	:	:
of fires and maintenance of a detection	:	:
and "smokechaser" organization	117,247	31,000
Control of tree-destroying insects and	:	:
rodents on national forests	152,298	26,000
Timber and forest products sales, free and	:	:
administrative timber use, timber	:	:
surveys, management plans, and timber	:	:
stand improvement	51,629	31,000
Allocation and issuance of grazing permits,	:	:
supervision of range use by domestic	:	:
livestock, range surveys, and range mana-	:	:
gement plans on national forests	15,467	5,000
Supervision of recreational use of national	:	:
forests, including plans, operating,	:	:
policing, enforcing State sanitary laws,	:	:
and garbage disposal on public camp-	:	:
grounds	25,722	8,000

SUPPLEMENTAL FUNDS - Continued

Projects	Obligated 1940	Estimated obligations, 1941
Land-use management on national forests, in- cluding rental of land; land classifica- tion; action on claims entered under public: land laws; location and posting of national: forest boundaries; general surveys, plans, : and maps; aerial photography; land exchange:\$ 31,826 :\$ 2,000		
Construction of improvements other than roads: and trails. (Includes telephone lines, : fences, lookout towers, and observatories, : firebreaks, offices, barns, garages, dwell- : ings, outhouses, water developments, pipe : lines, public camp grounds, landing fields, : etc.) : 1,838,647 : 545,387		
Reforestation and revegetation of denuded national forest areas : <u>172,628</u> : <u>133,000</u>		
Total for foregoing projects :\$2,835,577 :\$ 908,387		
Administrative funds included above : <u>70,394</u> : <u>3,747</u>		
Total, Supplemental Funds (Direct Allotments) :\$2,765,183 :\$ 904,640		

(d) RECONSTRUCTION AND REPAIR OF ROADS AND OTHER IMPROVEMENTS,
NATIONAL FORESTS IN CALIFORNIA, 1940 - DECEMBER 31, 1940.

Second Deficiency Appropriation Act,
1940, available in 1941 for recon-
struction and repair of roads and
other improvements, national forests
in California (flood damage) \$200,000
Budget Estimate, 1942

PROJECT STATEMENT

Projects	1940	1941 (estimated)	1942 (estimated)	Decrease
Reconstruction and repair of roads and other improvements, national forests in California : ... : \$200,000 : : \$200,000				(1)

DECREASE

(1) Under the above title an appropriation of \$200,000 was provided by the Second Deficiency Appropriation Act, 1940 (approved June 27, 1940), for the reconstruction and repair of flood-damaged roads and other improvements on California national forests. The entire appropriation was obligated during the first six months of the fiscal year 1941.

- (e) RECONSTRUCTION OF ROADS, TRAILS, BRIDGES, TELEPHONE LINES, CAMP GROUNDS, AND OTHER IMPROVEMENTS ON THE NATIONAL FORESTS IN GEORGIA, NORTH CAROLINA, SOUTH CAROLINA, AND TENNESSEE.

First Supplemental Civil Functions Appropriation Act, 1941, for reconstruction of roads, trails, bridges, and other improvements in the national forests in Georgia, North Carolina, South Carolina, and Tennessee (flood damage). \$125,000
 Budget Estimate, 1942

PROJECT STATEMENT

Projects	: 1940:	1941	: 1942	: Decrease
	: (estimated):	(estimated):	:	:
Reconstruction of roads, trails, bridges, and other improvements in the national forests in Georgia, North Carolina, South Carolina, and Tennessee	: ...:	\$ 125,000	:	:(1) \$125,000

DECREASE

(1) Under the above title an appropriation of \$125,000 was provided by the First Supplemental Civil Functions Appropriation Act, 1941 (approved October 9, 1940), for the reconstruction and repair of flood-damaged roads and other improvements on national forests in Georgia, North Carolina, South Carolina and Tennessee. The entire appropriation will be obligated during the fiscal year 1941.

(f) WATER RIGHTS

Appropriation Act, 1941 \$20,000
 Budget Estimate, 1942 20,000

PROJECT STATEMENT

Project	1940	1941 (estimated)	1942 (estimated)
Investigation and establishment of water rights	\$19,873	\$20,000	\$20,000
Unobligated balance	127	..	..
Total appropriation	20,000	20,000	20,000

WORK UNDER THIS APPROPRIATION

Objective: To secure and to assure protection of the right of the Government to divert and use water necessary to the administration, development, and utilization of the national forests; also, as soon as possible, to establish Federal ownership of as much water as is essential to the full use and management of the national forests.

The Problem and its Significance: Except in the States operating fully under the riparian system for diverting and utilizing the natural flow in streams or of storing such in reservoirs, an appropriate State agency decides the individual company or agency which shall have the right to divert or store water, the amount of water, the purpose of use, and the place of diversion or of storage. Prior to securing an "adjudicated right" or "decree" to the water, a survey must have been made, an application filed, such fees as required paid, and a permit secured authorizing the diversion or storage of not exceeding a specified amount of water. Actual use for the approved purpose during a certain period of time is required before a claim can be made for an adjudication or a decree covering the amount of water which has been actually diverted or stored and for the approved purpose. In the event, however, that the water of a stream previously has been entirely "appropriated", a right to use can be secured only by purchasing an earlier water right either separately or with the land itself.

Prior to the fiscal year 1937, when the first appropriation for Water Rights was made, the Forest Service made no effort to secure State permits or to get adjudications, relying on the opinion of many that such for Federal Government uses were unnecessary. Prior to that time many hundreds of actual uses had been made. Also additional uses would be necessary soon or for work planned for later years.

The Forest Service uses water for ranger stations and other administrative areas, forest nurseries, public campgrounds and other recreation areas, lakes, swimming pools, fire protection, stock watering, ponds, impoundments for flood and erosion control work, miscellaneous water supplies, and in other ways. The number of uses is very great, but the amount of an individual diversion or storage is usually very small.

An uncontestable right to the use of the required amount of water is essential to the purpose of the activity or project upon or for which used. Accordingly, immediate action by the Federal Government was necessary to protect past investments and to make certain of adequate water supplies for current projects and those definitely planned in the future.

Plan of Work: Since all necessary work could not be financed from the appropriation for one or several years, attention was first given to uses on streams in the Rio Grande, Colorado, and other drainages where the amount of water available for appropriation and use is approaching exhaustion. Also first attention was given to those cases where the unit cost was the least, thereby securing the maximum amount of protection from the Federal expenditure. Usually postponed were the cases where the unit cost per water right was high, whether secured by the filing method or, and particularly, securing by purchase of an existing right granted to some other agency or to an individual. Engineering surveys had to be made, applications for permit prepared and filed, and the permit secured. From July 1, 1936, to June 30, 1940, the total expenditure was \$58,784.59, and more than 650 filings financed from this fund were made. During the fiscal year 1940 a total of \$19,873.10 was expended, as follows: Surveys (approximately 200), \$14,375.24; filings (approximately 300), \$4,140.43; \$450 for the purchase of water rights, and \$907.43 for miscellaneous expenses.

Past work has greatly reduced the number of water rights to be secured, but those remaining will usually cost appreciably more per case. Also purchases will have to be made of adjudicated rights or of land including the right to water. The cost of these is hard to estimate and varies greatly--from a few hundred dollars up to one which it is now believed will cost \$10,000. The latter is essential to the operation of a large, established, and important nursery. The expenditure necessary to complete the project, as now foreseen, is estimated at \$94,445. With \$20,000 expended from the fiscal year 1941 appropriation, and assuming a correct estimate of the cost of water rights and land, future appropriations of \$74,445 will be needed.

(g) FIGHTING FOREST FIRES

Appropriation Act, 1941 \$100,000
 Budget Estimate, 1942 100,000

PROJECT STATEMENT

Projects	1940	1941 (estimated)	1942 (estimated)	Increase or decrease
1. Fire suppression	\$3,622,001	\$ 5,902	\$ 67,000	+\$61,098
2. Protection of unappropriated public forest lands	122,087	..	33,000	+33,000
1941 appropriation obligated in 1940	-94,098	+94,098	..	-94,098
Total appropriation	<u>a/</u> 3,650,000	<u>b/</u> 100,000	100,000	..

(a) Includes \$3,550,000 forest fire deficiency provided by the First Deficiency Appropriation Act, 1940.

(b) Includes \$94,098 of 1941 appropriation obligated in 1940, but does not include 1941 fire-fighting deficiency.

CHANGES IN LANGUAGE

The 1942 budget estimates propose changes in the language of this item as follows (new language underscored, deleted matter enclosed with brackets):

For fighting and preventing forest fires on or threatening /the national forests/ lands under Forest Service administration, including lands under contract for purchase or in process of condemnation for Forest Service purposes, and unappropriated public forest lands, \$100,000, which amount shall also be /immediately/ available for meeting obligations of the preceding fiscal year.

Two changes are recommended in the language of this item. (1) The first will extend the scope of the fire fighting appropriation to all the lands under administration of the Forest Service, instead of limiting expenditures from this appropriation to national forests or adjacent lands. This change will make the Fighting Forest Fires appropriation consistent with the National Forest Protection and Management appropriation as to the areas on which certain expenditures are authorized.

(2) The phrase "immediately available" has long been used to make the appropriation available for the preceding fiscal year in those infrequent instances when the previous deficiency appropriation for spring fire fighting proves insufficient. When the Agricultural Act passes before June, this works as intended. The Agricultural Appropriation Act for 1940 was not enacted until June 30, 1939. It was feared for some time prior thereto that it might not pass until after July 1. This has happened before and is a continuing possibility. When it happens, the appropriation is not technically available for liabilities of the previous year, although the well-recognized intention was to make it so. A situation similar to that of 1939 occurred in the spring of 1940, when it was necessary to draw on the 1941 appropriation to the extent of \$94,098. Fortunately, the 1941 appropriation act was approved on June 25, 1940.

By means of the proposed change in language, the real intent of the present "immediately available" authority, will be accomplished, and in years when an extreme spring fire season and delay until after July 1 in passage of the Agricultural Act are coincident, the legal complications which might otherwise ensue under existing authority will be cleared up and acute practical difficulties removed.

WORK UNDER THIS APPROPRIATION

Project 1. Fire Suppression:

Objective: To extinguish all forest fires on national forests with a maximum degree of speed and a minimum of cost; to find the shifting point of equilibrium between speed and cost plus damage as a matter of general policy and practice; to find the same point with respect to each fire as it is discovered and worked on.

The Problem: The problem has already been partly outlined under "Forest Fire Control". The problem of speed vs. cost and damage is illustrated by the 1939 McVey fire in the Black Hills of South Dakota, the most destructive fire of that year. Damage was over \$350,000 and cost of suppression nearly \$40,000. This battle was lost at 11 p.m., about 10 hours after the fire was discovered when, with the fire at 1,600 acres in size and the fire lines almost closed, the fire suddenly picked up and started an unpredictable run which was not stopped until 22,000 acres of choice timber producing land had been thoroughly devastated. If the officers in charge had known what this fire would do at 11 p.m. the first night, they would certainly have increased the number of men in the attacking force and would have thereby pushed the completion of lines more rapidly.

But with the quantity of men and machines they had mobilized, they had every prospect of stopping the spread of the fire a few hours after 11 p.m.,--which would have been well within established standards of speed in ^{fire} suppression. Once every five or ten years a Black Hills fire makes one of these vicious night runs. The problem is to identify and 'shoot the

works' on this one fire out of a thousand or so before it is too late. For the national forests as a whole, probably more than 75 percent of all fires can be classified after they are out as easy jobs which one trained fire guard can handle alone. But on at least 4,000 of these 12,000 fires, as the trained dispatcher handles lookout reports and dispatches men, he is not sure whether he has a one-man fire. It may be a job requiring 2, 10, 100, 200, or 500 men with appropriate equipment and machines at the earliest possible moment. On thousands of fires which from the first report are obviously more than one-man jobs, the problem is even more acute. If 200 men are dispatched, the outcome may show either that 100 or 1,000 were required for the cheapest and most efficient initial attack. Even under the best management, output per man hour falls off rapidly with increase in the size of the force mobilized. Some margin of safety in organizing and dispatching the initial attack force is merely common sense, but just a trifle more margin of safety on all fires may easily run the cost of suppressing all fires up far beyond the compensating saving from those occasional instances where a potential catastrophe is caught and stopped in its early stages.

Significance: The strongest financial support and the highest technical and managerial competence in fire prevention and presuppression (organization of skeleton force of seasonal fire guards, etc.) would be futile without special measures to suppress those fires which are too much for guards and yearlong forest officers to handle. Over 8,000 temporary fire fighters were required to supplement the work of guards, forest officers, and cooperators in the recent occurrence of 1,347 fires in the Northern Region during the middle 10 days of July 1940.

Plan of Work: As in fire prevention and presuppression, fire suppression is a subject of intensive local planning. In eastern and southern national forests this planning emphasizes the selection and organization of crews of cooperators, each working under a carefully chosen volunteer "warden." One of the chief assurances against catastrophic losses from fires in the hurricane debris on the White Mountain National Forest is the organization and training of such crews. So long as management is successful in averting "job fires", such warden crews provide the cheapest and most efficient suppression of fires which seasonal guards and forest officers cannot handle. Neither the wardens nor members of their crews are always instantly available when needed. They have their regular duties on their farms and in their regular jobs and are under no obligation to stay continuously on a telephone or within reach of a messenger except when under conditions of special fire danger they are requested to do so by the dispatcher and are paid for such service. But, despite the fact that such crews are not instantly available at call, they represent a fire suppression force of great effectiveness and, in addition, provide an opportunity for the most effective dissemination of influence for fire prevention. A plan is now being shaped up by the Eastern Region for development, at a relatively slight cost, of the morale and effectiveness of the volunteer wardens, particularly with reference to fire prevention.

Project 2. Protection of Unappropriated Public Forest Lands:

Objective: To protect unappropriated public forest lands (public domain) from forest fires.

The Problem: Unappropriated public forest lands are widely scattered throughout the entire West and to a lesser extent in other parts of the United States. The Federal Government should pay for protecting these public lands from forest fires.

Significance: It is estimated that there are more than 25,000,000 acres of unappropriated public domain which consists of forest lands. A substantial part of this area carries valuable stands of timber, the loss of which by forest fire means a lessening of national wealth and depletion of a valuable and essential resource, which is also valuable from watershed protection, wildlife and recreational stand-points. These Government lands are widely scattered. In many cases they are intermingled with State and privately owned forest lands or are so located that protection can be given only by established protective organizations.

Plan and Progress of Work: The logical approach to protection of those areas, intermingled with or adjacent to areas now under organized protection, is by cooperative agreement with present established protective organizations under which the Federal Government will bear the cost of protecting its own lands. The accounts of these organized protective agencies are audited by the Forest Service, and the expense of protecting the public forest land is based on actual costs. Protection is at present confined to areas within organized protection units.

During calendar year 1939 organized protection was given the following acreages of unappropriated public forest lands under co-operative arrangements as outlined in the preceding paragraph:

	<u>Acres</u>
Arkansas	38,731
Arizona	33,114
Idaho	301,795
Montana	226,858
Minnesota	188,514
Washington	126,288
Oregon	343,274
California	<u>1,450,000</u>
Total	2,708,574

During that period there were approximately 300 forest fires on these protected areas, burning over about 60,453 acres, or slightly more than 2 percent.

In addition to areas now accorded protection, studies are under way on those public lands not yet under organized protection which it is hoped will lead to the initiation of fire control on those areas where protection can be given at reasonable cost.

(h) PRIVATE FORESTRY COOPERATION

Appropriation Act, 1941	\$100,000
Allotment 1941, proposed to be transferred in 1942 estimates to "Salaries and Expenses, Bureau of Agricultural Economics"	- 2,000
Total available, 1941	98,000
Budget estimate, 1942	98,000

PROJECT STATEMENT

Project	1940	1941	1942
		(estimated)	(estimated)
Cooperation with timberland owners ...	\$99,883	\$98,000	\$98,000
Unobligated balance	117	..	..
Total appropriation	100,000	98,000	98,000

WORK UNDER THIS APPROPRIATION

General. This activity is concerned with cooperation and leadership in the proper management of privately owned forest lands so that the Nation's timber resource will be efficiently developed, harvested, and utilized, and the areas of land suitable for the production of timber will be maintained permanently in the highest degree of productivity.

Objective: To secure better forest practices generally on privately owned forest lands, including the establishment of sustained yield of forest products where practicable; to take leadership in cooperation with forest owners in the solution of problems and private needs dealing with forest conservation and wise use, including those problems which hinder the stability and expansion of markets for forest products.

Problem: The crux of the forest problem is the manner in which privately owned timberlands are handled. There are approximately 341,000,000 acres of privately owned commercial forest land in the United States--only 5,500,000 acres are estimated to be under intensive management (sustained yield), 17,000,000 acres are reported

as being under extensive management (sustained yield), and an additional 47,000,000 acres are considered to be under extensive management but not under sustained yield practices. This means that only 70,000,000 acres, a bare 20 percent of the Nation's most valuable and highly productive timber lands, are under any management worthy of the name. The other 80 percent, a vast area of 271,000,000 acres, are handled largely without regard to the future, to the public welfare, or to any consideration of wise use of the land. These forests are being cut down and otherwise depleted at a faster rate than they are being replaced with new growth, and the quality is steadily decreasing. The result is inevitable--forest depletion, the wasting of a natural resource whose conservation is essential to America's well-being. No resource can survive when 80 percent is mismanaged.

Corollary to the inadequacy of management, the privately owned commercial forest lands as a whole are badly deficient in growing stock--that is, they do not have the number of trees, proper distribution of age classes, nor proper species to take full advantage of the growing power of the land. They are not contributing their share towards industrial development and employment. Under proper management these lands, which are chiefly valuable for growing forests, can be made to produce at least double their present volume growth of constantly improving quality. This means opportunity for the ultimate expansion of forest industries with resultant economic acceleration. In turn, it would also emphasize the problem of markets, a problem that goes hand in hand with forest management. Permitting forest lands to produce less than their inherent capacity is poor national economy.

No nation can exist without a forest resource. Wood is vital in the daily life of man. It cannot be manufactured, it must be grown. The vestige now remaining of America's once stupendous forest resource must be efficiently managed for the social and economic protection of posterity. Forests need no longer be destroyed to make way for farms. In general, these lands are not suitable for agriculture. We now have millions of acres of cut-over and tax-delinquent lands on which farming was unsuccessfully attempted.

Significance: Roughly speaking, this country has some 630,000,000 acres of forest lands. Slightly over one-half is in private commercial ownership, and, as far as wood production is concerned, it is the vital one-half. Ninety-five percent of the forest products used come from these privately owned areas--a yearly drain of 48,000,000,000 board feet, in addition to 44,000,000 cords of forest products measured by the cord. But the exigencies of commercial competition, the urge for greater profits at lower operation costs, the failure to give consideration to public responsibilities, and the unfortunate trend of "cut out and get out" commercial policies all too often result in the drain being centered in certain areas, with resultant complete and wasteful removal of everything remotely suitable for

cutting. The inevitable result is vast areas of abandoned cut-over lands--an alarming liability to local governments already suffering economic distress.

Proper management of privately owned commercial forest lands affects not only the present and potential supply of forest products but also the supply of water for power and irrigation, the navigability of rivers, the erosion of soil, and collateral benefits in employment, public health, and enjoyment. One million workers directly depend on employment from the forest resource; countless millions derive aesthetic, social, and recreational benefits therefrom.

Demand for wood cellulose grows rapidly. Innumerable new products are being produced, all dependent on wood. The stability and permanence of factories, industries, and communities must be guaranteed by an uninterrupted flow of raw wood material. Investments, employment, and public well-being are jeopardized unless forests are conserved and efficiently managed.

Because of the widespread location of privately owned forest lands in all parts of the United States, the multiplicity and varying character of ownership, the diversity of forest management problems, the lack of knowledge of sound management procedures on the part of private land owners, and the large stake which the public has in seeing that forest values are conserved, and because of the watershed, flood control, national defense, unemployment, and other interstate problems of like character which are involved, Federal leadership is essential.

Much exploration and initiatory work has been done. The limited appropriations made available have brought productive results and have proved that the approach of the Forest Service is correct and fruitful of accomplishment. During the fiscal years 1939 and 1940 the forest owners took sharp cognizance of Forest Service leadership. The pulpwood situation in the Southern States was brought to a focus. Remedial action was promised by the owners and users, and the Southern Pulpwood Conservation Association was organized and put on a working basis. The Forest Products Industries Conference was brought into being--a cooperative conference, with membership from public and industrial agencies, meeting together to formulate broad policies of betterment. Direct assistance has been given to States and Forest Service representatives have been assigned to work directly with State forestry agencies in the solution of private forestry problems.

Plan of Work: This work involves the organization of a force of highly trained technical experts, specially versed and qualified in the field of management of private forestry holdings. Training is to be given this organization for a broad front of attack on existing problems, including:

- (1) Studies of individual private and joint private-public ownerships to determine for them the best practicable methods and plans of forest management.
- (2) Cooperation with organized groups of private forest owners, including assistance on problems affecting markets.
- (3) Analysis of factors affecting success or failure of individual private forest enterprises.
- (4) Exploration of State and Federal legislation bearing on private forestry.

The basic work in the achievement of better forest practices will be through inventories, planning, and promotion. Inventories ordinarily comprise the collection and analysis of all information needed for the development of a specific management plan. Planning includes both forest working plans and forest programs. Working plans propose and explain improved methods of fire control, cutting, and operation; indicate the volume growth and cut through at least two cutting cycles; summarize probable costs of the management methods recommended and the justification for them. Only such data are included as may be necessary for the forest owner or operator to make a decision. Forest programs are for the public and private owners generally. They bring out the needs or action to be taken to obtain the greatest practicable benefits as illustrated by intensive or extensive inventories. They involve land-use planning, priority of uses, public benefits weighed against costs, and the parts to be played by the various agencies involved.

This work necessarily requires highly specialized talents and training. Field work and contacts are involved, and much direct liaison must be maintained with owners and representatives of timberland owners and industry. Intensive analysis must be made of factual data collected and conclusions and recommendations clearly drawn and stated.

As a specific example of the work which has been done and the results which have been achieved through this approach, the case of a large lumber company in the West is cited. In the past their logging and cutting operations have been with little regard for the future productivity of their cut-over timber lands. After study of their operations, the Forest Service presented a plan of good forest management which was convincing to the company. The result is that logging and cutting are now done on a basis which leaves the land in good productive condition.

The Forest Service has been more or less instrumental in securing better forest practices on the lands of some 20 other companies with resulting improvement in forest and watershed conditions, in security of employment and stabilization of communities, and in many other features of general and widespread public value.

Forest Research Funds

(i) FOREST MANAGEMENT INVESTIGATIONS

Appropriation Act 1941 \$605,000
 Budget estimate 1942 605,000

PROJECT STATEMENT

Projects	1940	1941	1942
		(estimated)	(estimated)
1. Silvicultural investigations	\$287,353:	\$269,776 :	\$269,776
2. Mensuration investigations	49,067:	53,988 :	53,988
3. Forest regeneration investigations :	100,541:	92,397 :	92,397
4. Fire protection investigations ... :	117,920:	107,950 :	107,950
5. Naval stores investigations	17,309:	15,584 :	15,584
6. Forest genetics investigations ... :	70,287:	65,305 :	65,305
Unobligated balance	926:	.. :	..
Total appropriation	643,403:	605,000 :	605,000

WORK UNDER THIS APPROPRIATION

General.

Section 2 of the Act of May 22, 1928 (U.S.C., Title 16, Sec. 581a), authorizes and directs the Secretary of Agriculture to conduct fire, silvicultural, and other forest investigations and experiments, to maintain certain designated forest experiment stations for that purpose, and to establish additional stations (among which is one in the tropical possession of the United States in the West Indies). Authority to establish an additional station in the Plains States was granted by the Act of June 15, 1936 (49 Stat. 1515).

Forest management investigations supply the facts on which sound forestry practices are based. They provide the information required by Federal, State, and private agencies and individuals to reforest, protect from fire, and manage forest lands for the most efficient and permanent production of all forest products, a major natural resource and industry.

There are 630 million acres of forest land in the continental United States, about 495 million acres of which are capable of producing timber in commercial quantities. The area involved extends 1,600 miles north and south and 2,800 miles east and west. In elevation it

ranges from sea level to 12,500 feet; in precipitation from less than 20 to more than 140 inches. There are over 50 major forest types and 180 commercially important species.

Investigations to supply the most urgent forest management research needs of this diverse forest empire are carried on at 12 regional experiment stations in the continental United States and at one station in Puerto Rico. These stations occupy a position of outstanding leadership in forest research and information obtained is made available to Federal, State, and private agencies equally.

Project 1. Silvicultural Investigations:

Objective: To obtain information necessary to grow and harvest forest crops; more specifically, to determine the distribution, habits, and requirements of about 180 commercially important tree species growing in 50 major forest types and to develop effective methods of growing and harvesting forests that will insure their perpetuation and the production of a maximum quantity of most needed forest products.

The Problem: There are over 300 million acres of reasonably well-stocked forests, both publicly and privately owned, for which it is essential to develop and apply best methods of improvement and harvest. There are also millions of acres that, because of destructive cutting and uncontrolled fire, have been seriously impaired in productivity and protective capacity. Much of this area must, in the national interest, be rehabilitated. Because of its large forest holdings and broad interests, the U. S. Forest Service bears major responsibility for research to supply the necessary facts and makes its findings available equally to all.

Significance: To a considerable segment of the American people forests are a means of livelihood and a way of life. Their improvement and renewal offers productive employment and an economic basis for several millions of people of very low present income. Productive forests are a major contributing factor to national solidarity and strength. An impending national emergency makes it particularly essential that this research be continued. Research is necessary to provide a sound basis for regulation and to insure that imperative national needs for forest products can be met with minimum permanent damage to the forest.

Plan and Progress of Work: Silvicultural investigations are now carried on at 13 regional experiment stations in close cooperation with other lines of forest research. This research has had a profound influence in bringing about improved harvest cutting practices on public and private forest lands. It has developed practicable methods of thinning, pruning, and other forest improvement measures applied on a national scale by the CCC and other agencies. There is a long way yet to go, however, and this type of research, by its very nature, must be a continuing job. Spectacular results cannot be obtained every year.

Recent progress in putting silvicultural information into directly usable form has been made through the operation of experimental forests on a pilot plant basis. Particular progress has been made on the Olustee (Florida), Blacks Mountain (California), Fort Valley (Arizona), and Upper Peninsula (Michigan) experimental forests. Much progress has also been made recently in developing sound and efficient forest stand improvement measures. When this work was first undertaken on an extensive scale by the CCC, the technical basis was inadequate. Research, plus study of past experience, is now furnishing the basis for a forest improvement program that buys much more per dollar or CCC man-day expended.

A drive is in progress to bring together and integrate into usable form available silvicultural information in several forest types. For example, silvicultural knowledge resulting from over 25 years of research and 30 years of national forest cutting practices in the valuable western white pine type of northern Idaho has been brought together under one cover, supplying the scientific basis for cutting practices in the type.

Project 2. Mensuration Investigations:

Objective: To determine the volume, rate of growth, and yield of forest trees and stands and to develop basic techniques for the design and analysis of all forest research investigations.

The Problem: To prepare for each of approximately 180 commercially important forest tree species in the United States volume tables giving the tree contents in board feet or other units; to develop methods of measuring growth and yield of forest trees and stands; and to devise improved methods of experimentation to increase the efficiency of all forest research work.

Significance: Sustained forest harvests from timber lands, whether in national forest, industrial, or small private ownership, depend upon accurate inventories and reliable estimates of growth obtainable under different management methods. A businesslike approach to forest management is impossible without accurate information on forest growth and yield.

Fundamental developments in experimental design and analysis have resulted in large increases in experimental efficiency and economy. Continued research progress in solving the really difficult problems necessitates sharp tools that are an important responsibility of this project to supply.

Plan and Progress of Work: Work on this project is carried on at 10 regional experiment stations; also at the Washington Office, where the forest measurements section serving the entire Forest Service is located.

Marked progress has been made in constructing the most needed forest volume, growth, and yield tables, though the program is not complete. Advances in statistical techniques have resulted in great savings and increased accuracy in yield and volume table construction. For example, through development of mathematical equations of tree form, a volume table now can be constructed by measuring from one-fourth to one-fifth the number of trees that would have been required by methods employed a few years ago.

The accuracy of the nation-wide forest survey depends on sampling efficiency. Thousands of dollars a year have been saved by the adoption of sampling methods that will give the answer desired with the least possible expenditure of time and money. More efficient experimental design in this and other lines of work has made it possible in many instances to buy approximately twice as much for the research dollar.

Project 3. Forest Regeneration Investigations:

Objective: Development of effective methods of reforesting denuded or poorly stocked forest land by planting or sowing.

The Problem: Artificial establishment of new forests is a highly technical job and success depends on doing many separate operations well. Good tree seed in large quantity must be collected, extracted, and stored; millions of seedlings of the best species and size for field planting must be grown cheaply in forest nurseries; planting stock must be dug out, graded, and shipped often considerable distances; the most suitable species must be planted at the right time and place without damaging or drying tender roots; and field sowing must be done under carefully regulated conditions. The problem is to develop effective and efficient methods of doing all these things.

Significance: It is estimated that there are 83 million acres of unproductive forest land and 55 million acres of abandoned and sub-marginal farm land available for forestry in the United States. Between 70 and 90 million acres of this will not restock naturally and satisfactorily in the next 20 to 40 years. On millions of these acres forest planting is a public necessity to stabilize eroding soils, protect watersheds, and produce needed forest products. About a half million acres a year are now being planted by all agencies, public and private. The scale is enlarging but still inadequate. On the national forests alone, there are 27 nurseries producing in 1939 nearly 133 million trees annually, which were planted on 131,892 acres. The total cost per planted acre was about \$11. This planting program is being materially enlarged, and it is important that research keep up with it. The U. S. Forest Service is also the recognized Federal "subject-matter specialist" in reforestation and exercises leadership in research extending beyond its own immediate needs.

Plan and Progress of Work: Research is carried on at 11 regional forest experiment stations in close cooperation with national forest and other public and private agencies engaged in reforestation. The research program is constantly being pointed to solve the most urgent problem, and results are made generally available. In practice the work is broken down into studies--each concerned with a single specific problem. They group into studies of seed collection, extraction, storage, and germination; nursery production and management; adaptability of various species to different growing conditions; and methods of direct seeding or field sowing.

Research progress is reflected in lower costs of established trees. For example, three recent years of planting research in the Lake States, directed toward the solution of current planting problems, had a large part in raising plantation survival from 50 to 75 percent, an estimated saving of \$200,000, by a \$17,000 research program. Similar results in generally improved nursery and planting technique have been obtained in other forest regions. The job goes on; each year new and unexpected problems arise that must be met.

It is believed that recent research in seed storage methods will save thousands of dollars annually by preventing losses in storage and making it possible to store most seeds 3 to 4 years instead of 1 or 2, an item of great importance, since nurseries must maintain even production and good tree seed crops are not always available every year.

After several years of determined effort to solve stubborn problems in direct seeding, progress has been made that promises to make the method a valuable adjunct to planting. Direct seeding has the great advantage that pre-growing of young trees is not necessary and sowing can be done over a longer period and at times when field planting is impossible.

Project 4. Fire Protection Investigations:

Objective: Better fire control at minimum cost.

Problem: To determine how and why forest fires start; how fast they spread under given conditions, methods of detecting and suppressing fires, and measurement of fire damage and effects.

Significance: Fire control is a costly and highly technical job essential to the continued practice of forestry of any kind. The U. S. Forest Service spends about 10 million dollars annually protecting 208 million acres within national forest boundaries. A little over 9 million dollars are regularly spent protecting 260 million acres of State and private lands. Besides directly paying about 1.8 million dollars of this, the Federal Government is also contributing about 17 million dollars annually through the CCC in fire control and fire control improvement.

Costly experience has shown that research is necessary to get the most out of the fire control dollar, and few research projects have been as productive as this one in concrete accomplishment. Fire research is highly specialized and lends itself to concentration. Because of its extensive forest holdings and wide interests, leadership in this field is exercised by the Forest Service.

Plan and Progress of Work: Research is carried on at 7 regional forest experiment stations. Results are made available to Federal, State, and private agencies and have had a widespread influence beyond national forest boundaries. In practice the work is broken down into specific studies, each aimed to solve some pressing problem. They include studies in smoke visibility under various atmospheric conditions; the relation of weather, topography, and fuel conditions to fire occurrence and behavior; fire danger measurement and forecasting; methods of attack and equipment; and extent and character of damage caused by fires.

An outstanding contribution of fire research has been the development of fire danger meters. Weather, fuel, visibility, and activity of fire-causing agencies are integrated into a simple numerical scale of 6 or 7 classes giving a quick measure of total fire danger. This system is the present basis for determining distribution, strength, and speed of attack of the national forest fire control organization. Methods developed have been widely applied on State and private forest lands.

Fundamental studies of visibility and an analysis of human ability to detect fires have furnished the technical basis for the entire fire detection system.

Studies of forest fire behavior and of fundamental laws of combustion under controlled conditions are furnishing a basis for accurate appraisal of forest fuel hazards, the basis for distribution of man power in fire control.

Project 5. Naval Stores Investigations:

Objective: To improve technique of turpentine production and the equipment used; also to determine the effect of tree size, weather conditions, and surface fires on yields, the effect of various methods of turpentine on the growth and timber quality, and how turpentine and timber production can best be combined.

Problem: Early crude, wasteful, and inefficient methods of naval stores production have been much improved by research. But the hard fact remains that competition from other industries has reduced the price below the cost of production. To stay in business turpentine producers must close this gap. Research to increase gum yields and better integrate the industry into sustained production of all forest products is the key to a permanent solution as the bottom has been about reached on economies in direct production methods.

Significance: The naval stores industry has long been important in the South. It covers a gross area of 72,000,000 acres, of which 72 percent is devoted to the growing of trees. About 500,000 units, worth \$25,000,000, are produced annually. Georgia leads in naval stores production (the industry being exceeded only by cotton in importance); Florida ranks second, and Alabama third. These three States make up the bulk of production. About 50,000 wage earners are employed in the industry.

Because of the industry's distressed condition, Federal aid to producers since 1936 has averaged about \$1,000,000 annually. In addition, a total of about \$60,000,000 has been loaned on turpentine and rosin. This situation obviously cannot continue indefinitely, and thus research to help pull the industry out of the red is of particularly practical significance.

Plan and Progress of Work: Research is concentrated in Florida under the direction of the Southern Forest Experiment Station. Different methods of turpentinizing are tried out and resulting yields analyzed for quantity and quality. The merits of different kinds of equipment are determined by field tests. Factors influencing yields, such as weather conditions, season of year, size and age of tree, width and depth of face, and frequency of chipping, are determined. Effects of turpentinizing practice on tree growth and yield are studied by repeated measurements on chipped and unchipped trees.

Improved turpentinizing practices largely resulting from research have lowered production costs from about \$60 to \$53 per unit. Recent attention has been concentrated on possibilities of increasing gum yields. In 1939, of several chemicals tested, a 25 percent solution of sulfuric acid was found to increase gum yield from 20 to 30 percent, depending on type of chipping and species. Contrary to conventional belief, winter chipping was not found detrimental to tree vigor and gum yielding capacity. A flexible schedule of chipping to suit weather conditions, season, and gum yielding period has been worked out to increase total yield.

Project 6. Forest Genetics Investigations:

Objective: To produce trees of faster growth, better form and quality, and of greater resistance to diseases and insects.

Problem: Individual trees of the same species differ widely in form, rate of growth, quality, and resistance to diseases and insects. The problem is to segregate and produce trees of desirable strains by tree selection and breeding, a procedure of long proven value with other crop plants. The field is practically unexplored.

Significance: Development of practicable methods of identifying and propagating desirable tree strains may well revolutionize industrial forestry. Genetical research may make possible production of

nursery stock that will develop into uniformly straight, fast-growing, and resistant trees instead of the "garden run" which is the rule today. Widespread forest improvement through mass selection may be practicable once genetically superior strains can be readily identified.

Plan and Progress of Work: Intensive research is carried on at the California and Northeastern Forest Experiment Stations, and some work, principally observation of geographical strains in plantations, is carried on at three other stations.

The work involves the study and segregation of geographical strains or races, studies of the technique of natural and artificial cross pollination, experiments in hybridization, genetical constitution and transmission of desirable characteristics, budding, grafting, and other methods of vegetative propagation, and field trials of promising strains.

Most of the work has been initiated too recently to yield concrete results. Past research has shown conclusively, however, the existence of geographical races in ponderosa pine and Douglas-fir, and extensive further tests on the pine are now under way. This work has been a contributing factor in the promulgation of a Departmental seed policy requiring that forest tree seeds used in nurseries be of strains known to be suitable and preferably of local origin and that source and year of origin be shown on all shipments of tree seeds.

This project has contributed materially to the production of superior strains of poplar and aspen, offering great possibilities in economical pulpwood production. Outplantings of 58 promising strains are being tested at 25 places over the country. Much progress has also been made in developing necessary genetical techniques. Practical methods of fertilization, pollen storage, and production of hybrids have been worked out. Grafting has been successfully performed with 11 different species of pines.

SUPPLEMENTAL FUNDS

Direct Allotments

Projects	:	:
	:Obligated,	: Estimated obligations,
	: 1940	: 1941
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<u>Emergency Relief, Agriculture,</u>	:	:
<u>Forest Service (Transfer from WPA): For</u>	:	:
<u>projects in connection with research in forest</u>	:	:
<u>management:</u>	:	:
1. Silvicultural investigations	: \$116,004	: \$35,867
2. Mensuration investigations	: 9,447	: 2,921
3. Forest regeneration investigations	: 10,074	: 3,115
4. Fire protection investigations	: 34,436	: 10,647
5. Naval stores investigations	: 6,282	: 1,943
6. Forest genetics investigations	: 13,167	: 4,071
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Total, above projects	: 189,410	: 58,564
Administrative funds included above	: 3,600	: 1,400
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Total, Supplemental Funds (Direct	:	:
Allotments)	: 185,810	: 57,164
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(j) RANGE INVESTIGATIONS

Appropriation Act, 1941 \$270,935
 Budget estimate, 1942 270,935

PROJECT STATEMENT

Projects	1940	1941 (Estimated)	1942 (Estimated)
1. Grazing management investigations...	\$170,605	\$195,717	\$195,717
2. Artificial reseedling investigations:	59,179	59,218	59,218
3. Range forage investigations	15,988	16,000	16,000
Unobligated balance	163	---	---
Total appropriation	245,935	270,935	270,935

WORK UNDER THIS APPROPRIATION

General. The research under this appropriation concerns the problems of grazing use of forests and of other ranges, public and private, totaling 900 million acres--nearly half the land area of the United States. Grazing use of the forest lands of the South, Midwest, and West and of untimbered range lands of the West, produces a high proportion of the Nation's requirements of such vital defense commodities as meat, wool, and hides. Restoration of the forage resource and sustained production of livestock on these native forage-producing lands at this time is of especial importance to the Nation and the social and economic welfare of hundreds of thousands of small farmers and ranchers of the West and South.

Range investigations furnish Federal, State, and private agencies with the basic information so necessary for the administration and intelligent handling of forest and other range lands. They aim to insure the stability of the range livestock industry and the forage resource upon which it depends. They have formulated the methods necessary for range improvement by stockmen, revegetation for flood control, and other range land phases of the work of the CCC and other range conservation programs. It is conservatively estimated that application of results of these studies have benefited and saved stockmen and farmers some 22 million dollars annually. These investigations alone can supply the information required for sustained range-forage production and economical means of revegetation under constantly changing weather, biological, and economic conditions.

Section 7 of the Act of May 22, 1928 (McSweeney-McNary Forest Research Act), authorizes experiments and investigations under the direction of the Secretary of Agriculture to develop improved methods of management, consistent with the growing of timber and the protection of watersheds, of forest ranges and other ranges, at forest and range experiment stations, or elsewhere. The work is carried on under the following projects:

Project 1. Grazing Management Investigations:

Objective: To develop methods for managing lands producing native forage, involving the determination of the grazing capacity of various range types and ways and means of restoring and maintaining better forage plants, improving methods of handling livestock on ranges, controlling losses from poisonous plants, reducing the fire hazard by grazing, and harmonizing grazing with timber production, wildlife, and other land values.

The Problem: Through years of neglect and misuse, accentuated by recent droughts, the vast western range resource is far below its potential productivity; soil erosion is rampant, and livestock production is uncertain and costly. It is of vital importance to devise practical ways and means of grazing management to stop range depletion and restore, and thereafter maintain, the resource in perpetuity, while at the same time permitting economic use. Southern forest ranges support a huge native forage resource, which offers real possibilities for better livestock production, with benefit to farmers through improved grazing management.

Significance: Results of grazing management research apply to the West and Southeast. Better grazing management of forest lands of the Southeast will round out yearly forage requirements for livestock in that area and furnish the needed diversification in agriculture and in human diet. The vast western range lands, consisting of prairies, plains, deserts, valleys, foothills, mountain highlands, timbered and nontimbered areas, because of relatively meager precipitation or other adverse climatic conditions, rough topography, thin soils, and the lack of water for irrigation, are best used for livestock grazing and watershed protection purposes. In the West these lands make up three-fourths of the total land area and are highly interwoven and interrelated with crop-producing lands. Excluding irrigation improvements, the 1930 census values farm lands and buildings, privately owned range lands, and farm and range livestock, etc., in the West alone, at nearly 13 billion dollars. Western agriculture is in great part a complex of interdependent crop farming and grazing of range land. The western range territory produces about 75 percent of the national output of wool and mohair, and in pounds of live weight, about 55 percent of the sheep and lambs, and nearly one-third of the cattle and calves. Consequently, adverse effects on range brought on by faulty management



have serious repercussions on this integrated agricultural enterprise. Improved management builds the resource, increases returns to producers, and, in turn, better the welfare of thousands of local communities and even metropolitan centers.

Plan and Progress of Work: The work is being conducted by six regional forest and range experiment stations in the West, and one in the Southeast. Experiments are conducted with cattle and sheep on various types of range lands under several systems of management and degrees of grazing. Observations and measurements are made to show how many animals of a given class may be grazed on each broad range type over a period of years and still maintain the forage vigor and productivity; what damage occurs to forage, timber reproduction, and watershed protective values and what methods of management minimize such damage and best induce the restoration of forage cover on range lands depleted by drought and overgrazing. Studies in range ecology and plant physiology are made to determine the stages of natural plant succession on the range, how grazing can be managed to encourage the natural trends, and how the more important range forage plants are affected by climate, soil, natural fauna, and grazing. Costs of various methods of range management are determined. Results are analyzed as a basis for broad regional and national policies affecting range land use.

Many far-reaching results have been obtained. Recent results in the Southwest and Intermountain regions emphasize the great importance of conservative grazing, particularly on range subject to severe periodic droughts. On Southwestern semidesert experimental ranges, stocking at 20 to 25 percent below average forage production is a needed reserve as an assurance against recurrence of drought to protect the stand of forage and livestock production. Grazing on experimental ranges on this basis contrasted with heavily stocked outside unregulated range of potentially equal productivity shows that grazing capacity on the managed range is double that of the outside range, net calf production more than half again larger, and death losses approximately one-third. Conservatively grazed areas have actually maintained production better and in some instances improved faster than ungrazed areas. Of primary importance is that conservative grazing gives maximum assurance of available range forage year after year, thus resulting in a minimum of supplemental feeding, and in materially increased herd earnings. In the mountains of Utah, stocking approximately 20 percent below average forage production has been found the wisest management practice, while safe utilization on spring and fall ranges in southern Idaho characterized by sagebrush-bunchgrass vegetation is 65 percent of the average forage production.

Another example: Deferred grazing, developed by research and widely used on national forest ranges, has now been applied as a betterment practice on 66 million acres under the range conservation practices of the Agricultural Adjustment Administration.

Project 2. Artificial Reseeding Investigations:

Objective: To determine what native species justify selection for improvement; the true possibilities for adaption of native and introduced species to seeding or transplanting; and how they can be most economically established on range lands.

The Problem: Neglect and misuse have gone so far on much of the range that natural recovery is impossible or impractical and beyond the scope of grazing management alone. The problem is to develop and supply information as to plans and methods to use in reseedling or planting to restore and build up the depleted ranges and submarginal dry farm land abandoned to cultivation.

Significance: A third (some 240 million acres) of the entire western range has been so deteriorated that revegetation by grazing management alone will require at least 50 years--much too long on critical key range and watershed areas to meet economic needs and to conserve the basic soil and plant resources. Breakdown is so far advanced on 50-odd million acres that seed plants of desirable species no longer exist. Large areas of former range land once plowed and now abandoned produce only annual weeds and other low value vegetation. People dependent on the productivity of these lands are stranded and on relief. Local governments cannot bear the burden of such areas of unproductive land--a social and economic problem in every western State.

Plan and Progress of Work: This work is being conducted on forest and other range lands largely by the Intermountain and Northern Rocky Mountain Forest and Range Experiment Stations. Promising native species are studied and grown in nurseries and thence on the range to determine the possibilities of their selection for large-scale range reseedling. Such characteristics as seeding habits, forage quality and productivity, ability to withstand grazing, and soil-binding capacity are studied. Observations and plot measurements are also made to determine nursery practices and planting methods most effective for assuring establishment of the plants on the range, and what grazing management must be applied to planted areas to assure permanence of the stand.

Recent results have shown: (1) Under open range conditions success is enhanced by loosening the soil by harrowing or disking before planting and covering the seeds with soil by use of a brush drag or by tramping by sheep; (2) on sagebrush range, contour furrowing about every three feet and covering the seed with a brush drag will enable a satisfactory stand without the necessity of plowing the entire area; (3) complete plowing or other elaborate soil preparation is not essential for reseedling abandoned dry farm lands; the seed is simply drilled in the weedy cover by a common grain drill; (4) crested wheatgrass has given best results on the lower and dryer sites, such as abandoned dry farms and valley, foothill, and lower mountain ranges; (5) big mountain brome and



smooth brome are widely adapted to range conditions at the higher altitudes, are good soil binders, and furnish abundant forage; (6) bluestem wheatgrass and Canada bluegrass are best adapted to heavy soils and rather dry sites; (7) numerous other plants which have proven promising in limited experimental range reseeding tests but which must be studied further before they can be widely recommended.

Based largely on these results, two million acres of public and private range lands have been successfully reseeded during the past few years, with benefits and savings of more than five million dollars.

Project 3. Range Forage Investigations:

Objective: To collect, analyze, and disseminate information on the identity, distribution, grazing requirements, life histories, forage and watershed protective, and other values of range plants.

The Problem: Growing on the range are thousands of individual plants. Some are good forage plants, some are worthless, and others are poisonous. Some can withstand grazing well, while others are easily killed out. The type of plants present largely governs the use of the range. Of primary importance, therefore, is the recognition, classification, and evaluation of the various range plants.

Significance: Upwards of 12 thousand species of plants naturally inhabit the great western range alone. Most phases of grazing management (such as the class of livestock for which range is best suited, proper periods of use, range grazing capacity, poisonous plant problem, etc.) are intimately bound up with the growth requirements and grazing value of the plants present. Before detailed studies can go forward basic knowledge regarding the identity, forage and other value, life history, and other ecological requirements of range plants must be obtained. Inasmuch as the lands are wild and a large part public, and as such studies cannot be undertaken economically by private owners, the responsibility for the study and classification of the plants is largely Federal.

Plan and Progress of Work: Collections of range plants are made by all Forest Service personnel concerned with range management. These collections are submitted to Washington where the technical work is handled by specialists. Cooperation is also maintained with the Bureau of Plant Industry and the U. S. National Herbarium for identification phases and with other Federal and outside agencies on general matters. The work includes collection and identification of all important range plants and the building up of a complete annotated working herbarium of range plants.

A significant recent accomplishment under this project was the completion of a range plant handbook, which includes pertinent information regarding grazing, watershed protective cover,



and recreational and other uses of 339 important range plants in a succinct, understandable, complete, readily usable form for live-stock men, range administrators, and other interested parties.

SUPPLEMENTAL FUNDS

Direct Allotments

Projects	Obligated, 1940	Estimated obligations, 1941
<u>Emergency Relief, Agriculture.</u>		
<u>Forest Service (Transfer from WPA):</u> For projects in connection with range investigations.		
1. Grazing management investigations....	\$24,535	\$7,586
2. Artificial reseeding investigations..	4,894	1,513
3. Range forage investigations.....	14,387	4,448
Total above projects.....	43,816	13,547
Administrative funds, covering above.....	833	--
Total, supplemental funds, (Direct Allotments).....	42,983	13,547

(k) FOREST PRODUCTS INVESTIGATIONS

Appropriation Act, 1941 \$632,500
 Budget estimate, 1942 632,500

PROJECT STATEMENT

Projects	1940	1941 (Estimated)	1942 (Estimated)
1. Timber harvesting and conversion investigations.....	\$94,000	\$94,000	\$94,000
2. Forest products statistics.....	10,000	10,000	10,000
3. Pulp and paper investigations.....	114,000	107,500	107,500
4. Strength of wood investigations....	134,157	123,000	123,000
5. Seasoning and physical properties investigations.....	94,000	89,000	89,000
6. Chemical composition and wood utilization investigations.....	70,000	66,000	66,000
7. Wood preservation investigations..	99,000	96,000	96,000
8. Wood structure investigations.....	49,000	47,000	47,000
Unobligated balance.....	24	--	--
Total appropriation.....	664,181	632,500	632,500

WORK UNDER THIS APPROPRIATION

General. The McSweeney-McNary Act of May 22, 1928 (U.S.C. Title 16, Sec. 581f), authorizes and directs the Secretary of Agriculture to conduct experiments, investigations, and tests with respect to the physical and chemical properties and the utilization and preservation of wood and other forest products, including tests of wood and other fibrous material for pulp and paper making, and such other experiments, investigations, and tests as may be desirable, at the Forest Products Laboratory, or elsewhere.

The work under this appropriation seeks to increase the usefulness and value of forest products and to broaden their markets; hence, to reduce waste, to increase the serviceability and satisfaction of forest products to the consumer, and to create new and useful products from wood. The work is divided along the following lines of activity.

Project 1. Timber Harvesting and Conversion Investigations:

Objective: (1) To promote the selective logging of forest stands by determining what tree sizes return profits and what sizes are logged and milled at a loss; (2) to establish cutting methods and utilization standards that net the highest continuing return from forest

land and from farm woodlands; (3) to develop the use of inferior species, thinnings, and woods and mill waste for special products, dimension stock, and short-length products; and (4) to develop improved grading standards for lumber and other forest products to meet the use requirements of the ultimate consumer with respect to sizes, dryness, defects, and inherent properties.

The Problem: The owner of forest land should more and more be made aware that practically his only chance of low-cost and high-yield production is to remove only the larger trees, leaving the smaller trees to grow and restock the land. Also a major forestry problem is to put more species to use on the basis of their best utility value. This is coupled with the problem of converting the 50 percent waste in the woods and mill into marketable commodities. This activity is concerned with mechanical conversion possibilities in these fields.

Significance:

(a): Millions of acres of cut-over lands barren of growing stock in the South, the East, the Lake States, and of late in the West are the result of the general belief among timber operators that maximum returns necessitated taking all trees of the desirable species that would cut out any standard lumber. This is poor business and poor forestry.

(b). Under prevailing practice the timber that has been left or that has restocked the cut-over areas has been largely of so-called inferior species; aspen and birch in the Lake States; beech and birch in the East; elm, hackberry, tupelo, and low-grade oaks in the South; and white fir, western larch, and western hemlock in the West. Putting these species to use and thereby preventing them from dominating the new stands is a major forestry problem.

(c). Woods and mill waste amount to something like 50 percent of the timber volume.

(d). Rules of grading lumber often lead to misunderstanding between manufacturer and user. This activity seeks to protect the interest of both by improvement and simplification.

Plan and Progress of Work: Selective logging studies are carried on in the woods in cooperation with companies doing commercial logging. The necessary number of trained observers equipped with stop watches record the time it takes to perform each operation, such as felling, bucking, transporting, etc., for trees of different diameters (10", 12", 14", etc.). The same procedure is used in the mill. The wages paid to the various classes of men, when applied to the time data, enable the cost of producing lumber from trees of various sizes to be determined. These costs compared to the market value of the lumber show the profit or loss in producing lumber from trees of various sizes. These studies and similar ones involving pulpwood,

poles, etc., are closely correlated with silvicultural conditions so as to leave the forest in proper condition for future growth. The proportion of high-grade lumber than can be cut from logs is, of course, the biggest factor in their value. Small sawmills have been notoriously inefficient in getting the most out of their raw material. A good start has been made in cooperation with State foresters and others in bringing about improvement in such mills. A recent design for a small portable mill embodying several new features looks very promising. Considerable improvement has been made in grading lumber, but much remains to be done in simplifying and unifying present methods.

During the past year significant progress includes the following:

1. Northern hardwoods in the Lake States and New England have been made the subject of six intensive mill studies to correlate log surface characteristics with lumber grade yields as a basis of tentative log grades now at hand.
2. The use of low grades as sheathing in house construction has been advanced through assistance of the Federal Housing Administration in the preparation of specifications relative to admissible defects.
3. Short lengths from low-grade timber in the form of dimension stock wall panels for use in small house construction have been explored with encouraging results.
4. The use of weight in lieu of volume as an equitable basis of measuring southern pine pulpwood has been studied. For green wood, indications are favorable to weight basis.
5. Continued progress has been made on the development of a portable band mill and power pruning saw.

Project 2. Forest Products Statistics:

Objective: To supply information as to the production, consumption, and distribution of lumber and other forest products, including the collection, compilation, analysis, and publication of these data, either independently or in cooperation with other agencies.

The Problem and Significance: Information as to the production, consumption, and distribution of lumber and other forest products is essential to the orderly manufacture and marketing of forest products; the maintenance and proper distribution of adequate and suitable supplies of raw materials for wood users; and as a basis for planned forest production. These data form the necessary economic background needed by Federal, State, and private agencies dealing with forest industrial and social programs and policies.

Plan and Progress of Work: The work is handled by statistically trained foresters in the Washington Office and at several of the western forest experiment stations. Under a cooperative agreement with the Bureau of the Census, data are obtained from the forest industries

concerned by a canvass and are then compiled, analyzed, and published. This has been a continuing cooperative project since 1902 and has functioned in the usual manner since then, the Forest Service conducting the yearly canvass of lumber and timber products in the 12 western States.

Project 3. Pulp and Paper Investigations:

Objective: (1) To determine the suitability of American woods for pulp and paper production by standard processes, (2) to adapt standard processes to species not now used for pulp, (3) to improve both pulping and paper-making processes so as to increase product quality and yield, (4) to develop new processes which will enlarge the scope of wood utilization in paper and fiber products, (5) to eliminate wastes in pulp and paper making, and (6) to check stream pollution by developing methods of recovery and re-use of waste cooking liquors.

The Problem: Thirty years ago spruce pulpwood supplied more than 60 percent of our paper needs, and the remainder came mostly from balsam, hemlock, and poplar. At that time the United States was practically independent of foreign countries for its pulp requirements. By 1915, however, we were dependent on outside sources for more than half the pulpwood needed to meet American requirements. The problem has been to develop and demonstrate the suitability of our various woods for pulp and paper and the development of new and improved manufacturing processes.

Significance: The value of pulp and paper products produced annually in the United States is, roughly, one billion dollars. The domestic consumption of wood for paper is approximately 9 million cords (about 12 percent of which is imported) valued at 75 million dollars. In addition, wood pulp and paper are imported to the equivalent of about 6 million cords of wood. The use of wood far exceeds that of any other raw material for pulp, and, although the quantity thus used constitutes only about 6 percent of the total timber cut of the United States, it is of large importance by virtue of being a profitable outlet for a class of timber and for wood wastes having practically no other value except as fuel. Furthermore, the removal of much of this material (as thinnings, etc.) is a factor in good forestry practice in growing the timber crop. The recapture of a profitable outlet for domestic wood to replace the import balance of pulp, paper, and pulpwood consumed in the United States would double the national income for pulpwood, as well as add large values in manufacture and provide jobs for at least 250,000 persons not now gainfully employed.

Plan and Progress of Work: In testing the suitability of various woods for paper the raw material is received at the Laboratory in the form of bolts, logs, or mill waste. In the mechanical process, the pulp is produced by simply grinding the wood on a revolving stone. By varying the speed of the stone, the pressure of the wood

on the stone, the sharpness of the stone, etc., different qualities of pulp are obtained. The three other processes depend upon the chemical action of various reagents which dissolve the non-fibrous components of wood and leave a fibrous residue. In all chemical processes the wood is reduced to chips and cooked in pressure vessels at a relatively high temperature. By varying the strength of the chemicals, the duration, temperature and pressure of cooking, the methods of processing and bleaching the pulp and running it over the paper machine, wide variations in paper quality are obtained and modified or new processes evolved suitable to the production of certain kinds of papers. Search is constantly going forward to find new or modified processes that will make it feasible to use woods other than spruce which still supplies 15 to 20 percent of our domestic pulpwood. Much prominence has recently been given to the southern pines as a possible source of newsprint. This work will be continued, as will the work to find a process adapted to pulping Douglas fir, especially in the form of woods and mill waste of which enormous quantities are available for pulping.

During the past year significant progress includes the following:

1. Where growth rates of young-growth and old-growth were the same, the young trees showed advantages in all pulp strength qualities except tear. Previous observations of pulping differences between butt and top logs were verified.
2. Hardwood semichemical pulps (red and black gum, birch, aspen) were successfully converted into newsprint papers through combination with southern pine and jack pine groundwood pulps.
3. Various southern hardwoods (red gum, blackjack oak) were successfully pulped, bleached, and converted into high-grade book and bond papers; high-yield semikraft pulps from the same species were found suitable for good-quality corrugating and liner boards, opening new outlets for these species; bleachable sulfite pulps were made from the same species.
4. Western white pine was found very similar to jack pine in pulping characteristics by the sulfate and sulfite processes.
5. In pulp evaluation studies satisfactory progress was made relative to such important properties as fiber stiffness and mat drainage characteristics.
6. About 200 different kinds of papers and boards were produced experimentally, largely in connection with studies of the paper-making qualities of a number of species pulped by various modified processes. The independent variable of calendering was intensively studied in its correlation with such sheet properties as surface smoothness and strength.

Project 4. Strength of Wood Investigations:

Objective: (1) To determine the strength, stiffness, and other properties of wood that classify it as an engineering material, and (2) to correlate these properties with the design of wooden structures and fabricated articles.

The Problem: In order to use wood for various commodities and engineering structures we must know all about its mechanical properties. We must know how to assemble it in structures and how these structures will perform from a strength standpoint. Also the deficiency of nails, bolts, glues, and other media for joining it together must be known. Hence the problem is one of determining its strength characteristics and factors that influence them, methods of fastening wood pieces together, and the strength of the various assemblies.

Significance: Besides its importance to the average citizen and home builder, this project has a vital relation to the utilization of timber and the liquidation of forestry investments. Building construction normally consumes more than 60 percent of our annual production, a large proportion of this material going into small houses, but in recent years the use of wood in buildings relative to other materials has shown great decline, owing chiefly to the fact that lumber in construction does not reflect modern trends toward lower labor costs so evident in the handling and assembly of other materials. Improvement in the engineering of wood construction so that simple and intensive but thoroughly satisfactory wooden houses can be built would mean more dependable homes for families with small resources as well as new life in the construction industry. New developments in heavy timber construction which are now under investigation also promise a great advance in engineering economy. About one-sixth of the total lumber production is used for boxes and crates. Improvements in these and other containers benefit the consumer through their effect on the cost of shipping the products he uses.

Plan and Progress of Work: The project involves strength tests of the clear wood of all commercially important species from both virgin and second-growth stands in various regions and growth and investigations of the factors affecting properties, such as defects, moisture content, and weight; appraisal of the effect of preservative, seasoning, and other processes that are employed in preparing wood for use; determination of the efficiency of nails, bolts, glues, and other mediums for joining members or parts, and of strength of various assembled wood structures, such as wall panels, floor systems, roof trusses, and arches; and improvement in the strength and design of such fabricated products as boxes, crates, furniture, and doors.

In making tests to determine the strength properties of any given species in a certain region of growth five typical trees

are selected and careful descriptions made of each tree and the conditions under which it has grown. Full-sized timbers, such as bridge stringers, factory building timbers, etc., are tested to determine the influence of defects such as knots, shakes, etc., on strength and to serve as a guide in establishing working stresses and grading rules for structural material. Tests on wooden and fiber boxes and other containers are made by placing them in a large revolving drum. As the drum revolves the boxes fall on their edges, corners, and sides as guided by hazards on the interior of the drum and closely approximate conditions of actual use.

During the past year significant progress includes the following:

1. Continued assistance has been rendered the National Bureau of Standards in connection with tests made on structural units involving wood for low-cost house construction.
2. To further the more efficient utilization of low grades for house construction, a grading system for dimension has been developed by means of which definite design stresses may be assigned.
3. Studies have been completed on northern white pine to further the utilization of New England blow-down material.
4. Substantial progress has been made in the preparation of a bulletin presenting a complete schedule for the nailing of frame houses.
5. The department bulletin presenting the results of the study of modern metal connectors is nearing completion.

Project 5. Seasoning and Physical Properties Investigations:

Objective: (1) To develop methods and apparatus for the air-drying and kiln-drying of wood; (2) to determine the physical properties of wood such as shrinkage, equilibrium moisture content, drying characteristics, and insulation values; (3) to develop methods of storing and handling lumber and lumber products from manufacture to ultimate use; (4) to determine the proper moisture content of wood for various uses; and (5) to improve house construction so as to avoid cracking, settling, and other defects due to moisture changes.

The Problem: "Wood is hygroscopic, that is, it takes up and gives off moisture. When cut it is green. To be used it must have the moisture removed during which process it shrinks. If later it takes up and gives off moisture, it swells and shrinks. The problem then associated with this phenomena is one of proper drying, of proper storage, and of moisture control during use.

Significance: Losses resulting from lack of proper seasoning methods or from poor storage, handling, and construction practices amount to more than \$100,000,000 annually and are made up of a variety of items, including (a) the entire loss of certain species which

cannot now be seasoned; (b) loss of footage and loss of value through degrade resulting from improper seasoning methods; (c) loss in value of fabricated products and structures due to damage from swelling, shrinking, and warping; and (d) losses of markets due to the user's dissatisfaction with imperfect articles and structures. The reduction of these losses in whole or large part is the goal of the work of the Forest Products Laboratory. Kiln-drying principles and methods developed at the Laboratory have revolutionized the kiln-drying industry and are in wide use. More than one-half of the kilns built in the United States in the past 5 years are of the internal fan type developed at the Laboratory.

Plan and Progress of Work: The material for seasoning tests is generally received at the Laboratory in the form of logs. The logs are cut into lumber of the required dimensions and placed in an experimental kiln where the temperature, humidity, and speed of circulation of the surrounding air can be accurately regulated and recorded. Samples at various places in the pile of lumber in the kiln are withdrawn at intervals for observation and the determination of moisture. The proper conditions to maintain in the kiln to satisfactorily dry lumber of various species for different uses are determined. Kiln drying tests on the southern hardwoods have shown some of these species to be among the most difficult to season satisfactorily. The moisture content of wood in buildings is studied by hanging wood samples in various places in selected buildings in various regions throughout the United States and weighing them at intervals, in order to determine the equilibrium moisture content. Seasoning studies involving preliminary treatments with salt show decided promise in checking subsequent shrinkage and swelling. Typical wooden houses embodying different construction methods are under inspection to determine the tendency of the framing and woodwork to cracking, settling, and other defects due to moisture changes.

During the past year significant progress includes the following:

1. The optimum rate of air circulation in lumber dry kilns has been determined for various species and items of wood. It varies from 1,650 feet per minute for maple sapwood to 500 feet per minute for oak heartwood under the same conditions.
2. Commercial field experiments have indicated that the kiln drying of southern pine poles preliminary to preservative treatment has distinct commercial possibilities.
3. Current laboratory tests and field observations indicate that fiberboard sheathing, used without vapor barriers, is an important source of condensation troubles in modern dwellings.
4. The discovery of the plasticizing effect of certain chemicals upon wood and the application of the discovery to forming, molding, and disintegrating wood gives promise of widespread and important developments in wood utilization.



Project 6. Chemical Composition and Wood Utilization Investigations:

Objective: (1) To study the chemical constituents of wood such as cellulose, lignin, and extractives by refined methods, including X-ray analysis, use of ultraviolet light, and hydrolysis, in order to secure basic information applicable to pulping, preservation, distillation, seasoning, etc., of wood; (2) to develop moulded products from wood; (3) to study the effect of various chemical and physical treatments on the hairlike capillary tubes in wood to evolve treatments that will increase or decrease its permeability to liquids; and (4) to determine the factors which govern the toxicity of wood preservatives with a view to suggesting new and better ones.

The Problem: Twenty-five years ago knowledge of wood chemistry was fragmentary and most of the opinions in regard to it were erroneous. Chemical utilization was very limited. The problem has been and continues to be one of learning the chemical composition of wood, its physical-chemical structure and properties, and the development of improved and new chemical processes and products.

Significance: Wood constitutes the largest and most convenient source of cellulose, one of our most important raw materials. Chemical means must be resorted to in isolating the cellulose from the lignin with which it is surrounded. Because it is an abundant and inexpensive material, science confidently looks forward to the conversion of cellulose into other important commodities in addition to paper, artificial silk, fabric, cellophane, lacquers, and plastics for which it is now used. The lignin with which cellulose is associated comprises one-quarter of the wood, but because of its chemical complexity no method of utilizing lignin has been devised. As a consequence, it is wholly wasted in the pulping processes. Since both cellulose and lignin must be isolated by chemical means and converted into other commodities by chemical processes, the economic importance of a thorough knowledge of their chemical nature can hardly be overestimated. The chemical composition of wood substance, the arrangement of constituent parts in the wood cell, the size and spacing of the cells, and the variation of all such characteristics according to species and growth conditions are intrinsic factors which determine the useful properties of wood in mass. A scientific understanding of these factors is essential to success in growing the material, in its selection, its seasoning and handling, its impregnation with preservatives, its use in construction, its conversion into pulp and other products -- in short, in all its applications to advancing economic requirements.

Plan and Progress of Work: The wood for chemical analysis is taken from trees selected in the forest. The test material is shipped either in log form or in smaller pieces so marked as to indicate their position in the tree with reference to height from the ground and distance from the center. Tests made on the extractives from durable species showed a high degree of toxicity. In western red cedar,

for example, two phenols in a liquid and a crystalline form were isolated. The latter was found equal to mercuric chloride (corrosive sublimate) in toxic effect on test fungi. This information may prove useful in developing a new wood preservative. Information derived from other work on the other extractives of Douglas fir and ponderosa pine and on the water soluble extractives of redwood has proved useful in termite investigations. Studies of the capillary structure of wood has led to the development of a single process of treating red oak barrels so as to prevent leakage through the pores of the wood.

During the past year significant progress includes the following:

1. The formation of phenol-formaldehyde resins within the intimate structure of the wood has been extended to the making of laminated compregnated wood and a combination of compregnated and normal wood with improved properties.
2. Drying constants for softwoods have been theoretically deduced from capillary-structure considerations. This affords a simple means of fixing drying schedules and gives a better insight into the mechanism of drying.
3. Hydrogenation studies have been extended to lignin and wood in aqueous suspension. In the case of wood, a cellulose pulp as well as valuable organic liquids and resins are obtained. Industrial possibilities appear promising.
4. Holocellulose contains larger amounts of alpha-cellulose than was previously believed to exist in the wood, indicating that part of the alpha-cellulose is degraded in the process of isolation by present methods. This opens up possibilities for improving present alpha-pulp yields.
5. The toxicity of several series of aliphatic compounds has been tested. A few of the compounds show possibilities for commercial use.

Project 7. Wood Preservation Investigations:

Objective: To improve methods of forcing chemicals into wood for protection against decay, insects, marine borers, and fire so that treatment will be more effective, less expensive, and less harmful to the strength of the wood; to conduct service tests to show the relative effectiveness of different chemical treatments; to develop fireproofing chemicals that are more effective, more permanent, less expensive, and generally more satisfactory than any now available; to reduce painting costs to home owners by making paint last longer on wood; to develop coatings and treatments that prevent moisture changes and shrinking and swelling; and to improve glues and gluing methods so that glued wooden products will give better service at lower costs.

The Problem: Wood decays under conditions favoring decay. It will weather and it burns. Its efficient and wider use, therefore, presents a problem of improving its resistance to decay, insects,

and fire and improving its appearance and resistance to weathering by better coatings and paints. Improved gluing technique has also been made a feature of this work project.

Significance: Rail transportation costs depend to a considerable degree upon the economy and efficiency in the use of wood for railway ties, bridges, poles, piling, and other construction, for the railroads use nearly one-fifth of the total annual lumber and timber production and spend over \$100,000,000 per year for wood and much larger sums for its treatment and installation. Preservative treatment has greater influence than any other factor in reducing annual costs for wood in railroad use. Likewise, telegraph, telephone, and electric light and power costs are influenced by the efficiency obtained in the use of poles and other wood in the distribution systems.

Fire losses in wooden structures constitute an enormous ^{economic} loss that can be reduced by the discovery of cheap and effective fireproofing methods. The cost to home owners of maintaining the paint on their property is estimated at 375 million dollars annually. In one case now pending in court, over 1 million dollars damage is claimed for early paint failure through a period of five years in a single real estate development. The strength and durability of glue points have a profound influence upon the service given by glued products (including furniture and plywood manufactures), for which the public pays about 1 billion dollars per year, and the losses from defective gluing are heavy. The performance of wood in floors, furniture, house trim, aircraft, and numerous other uses is impaired by shrinking and swelling with moisture changes, the prevention of which is of the highest importance in maintaining markets for wood. For all these reasons, the work under this project is largely of direct value to the consumer.

Plan and Progress of Work: Experiments to improve wood preserving processes are conducted with the aid of special treating cylinders capable of withstanding high internal pressures. The wood to be treated, in the form of railroad ties or in such form as may be desirable, is placed in the cylinder and the heavy door bolted shut. The cylinder is equipped so that the wood can be subjected to preliminary conditioning treatments with steam. After the steaming treatment a liquid preservative (creosote or zinc chloride or other chemical) is run into the cylinder and forced into the wood by pressure. The wood under test is subjected to various combinations of treatments based on preliminary studies of the penetrability of the wood structure to liquids. Marked progress in treating methods has resulted. Treated material is subjected to conditions of actual usage and service records kept. Panels of different woods painted with various paints are exposed in various parts of the country. Fire resistance is tested in a fire tube designed at the Laboratory. Full-sized structural units are also tested. Glues frequently deteriorate due to attack by micro-organisms. Such attack can be greatly reduced by the introduction

of a suitable toxic material into the glue. Special attention is now being given to the artificial resin glues.

During the past year significant progress includes the following:

1. The results of heat conductivity studies are ready for publication.

2. The proposed system of paint classification continues to offer great promise of solving many of the difficulties of consumers in purchasing and using paints to the best advantage, but the paint industry refuses to accept the plan. Efforts to get around this obstacle are continuing.

3. Cold-press urea-resin glue formulas appear to be improving and approaching more nearly to the goal of high strength, high reliability, and high moisture resistance, but they are not yet entirely acceptable.

4. Studies have indicated that western hemlock and the true firs can be cut satisfactorily into veneer and glued into plywood and that these species may be used to supplement the diminishing supply of Douglas fir "peeler logs" in the Pacific Northwest.

5. Fire tests on wood flush doors have shown that doors of this character can easily be built to resist fire for 30 minutes and, with suitable attention to design and construction details, can be made to last for an hour.

Project 8. Wood Structure Investigations:

Objective: (1) To identify wood species by microscopic cellular structure; (2) to determine the effect of growth conditions, such as spacing, thinning, pruning, size of crown, soil moisture, kind of soil, etc., on cellular structure, density, strength, shrinkage, and defects as a guide in selecting timber from present stands and growing timber of better quality; (3) to determine the effect of cell structure on strength, shrinkage, warping, and penetrance of liquids as an aid in selecting wood, diagnosing failures in service, and improving its inherent properties; and (4) to determine the microscopic processes of resin formation in the southern pines and to find the chemical nature, origin, and transformation of compounds associated with resin formation so as to obtain better yields with less damage to the forest.

The Problem: The factors involved in tree growth include soil, climate, stand density, and hereditary factors. Each of these has subdivisions and none is absolutely independent of the others. The problem is to determine how these growth factors affect wood quality and its ultimate utility. Also a problem in its efficient use is its proper identification as to species.

Significance: Knowledge of wood structure is essential in identifying the thousands of wood and pulp samples submitted by Government officials and the public. Such identifications help in selecting

the right kind of wood for a given purpose and in adjusting disputes between buyer and seller. Knowledge of the effect of growth conditions and structure makes it possible to overcome unfounded trade prejudices and broaden the uses of wood, to safeguard the public against defective material, and so to increase the value and efficiency of wood in service. The information obtained is of value in selecting species for reforestation, in the profitable use of marginal agricultural lands and overflow lands for producing future forest crops, and in controlling the growth factors which influence the properties of the wood formed. Such information has several times proved very helpful in criminal cases involving wood. The Hauptmann case is an example.

Plan and Progress of Work: In conducting studies to determine the effects of forest conditions upon wood quality and uses typical trees grown under various conditions are selected and felled and bolts shipped to the Forest Products Laboratory, Madison, Wisconsin, for microscopic study of the cell structure and tests of various kinds. Studies in progress on the southern hardwoods show that the oak subject to annual flooding grow more slowly and produced wood of lower average weight than elsewhere. In green ash, tupelo gum, water hickory, and persimmon the trees grown in the flooded areas contained lighter wood at the base than higher in the tree. Further studies will include the effect of growth conditions on hardwoods from the Cumberland Mountains of Tennessee, the relation of crown size to springwood and summerwood in the southern pines, and factors affecting the size of knots in northern white pine and Norway pine.

During the past year significant progress includes the following:

1. It was discovered that the relative capacity of thin sections of compression wood and the translucency of normal wood can be used in distinguishing even mild forms of compression wood from normal wood.
2. Data on variation of longitudinal shrinkage of springwood and summerwood were obtained for longleaf, shortleaf, and slash pines, the springwood shrinking from 3 to 5 times as much as the summerwood.
3. The wood of certain rapidly grown hybrid poplars furnished by the Northeastern Forest Experiment Station was found to be slightly lighter in weight than that of most native species previously tested.
4. The wood of second-growth southern Appalachian oaks was found to be up to 15 percent heavier than that of old-growth trees of the same species. The indications are, however, that there are no noticeable differences in specific gravity with reference to the quality of the site of the second-growth stands.
5. A partial job analysis of investigations on the relationship of growth conditions to wood quality was made.

SUPPLEMENTAL FUNDS

Direct Allotments

Projects	Obligated, 1940	Estimated obligations, 1941
<u>Emergency Relief, Agriculture,</u>		
<u>Forest Service (Transfer from WPA):</u> For		
projects in connection with research		
in forest products:		
1. Timber harvesting and conversion		
investigations.....	\$2,961	\$916
2. Forest products statistics.....	---	---
3. Pulp and paper investigations.....	3,540	1,094
4. Strength of wood investigations.....	6,381	1,972
5. Seasoning and physical properties		
investigations.....	5,885	1,820
6. Chemical composition investigations....	2,139	661
7. Wood preservation investigations.....	6,368	1,969
8. Wood structure investigations.....	1,499	464
Total, above projects.....	28,773	8,896
Administrative funds included above.....	547	---
Total, Supplemental Funds (Direct		
Allotments).....	28,226	8,896

(L) FOREST SURVEY

Appropriation Act, 1941.....\$250,000
 Allotment, 1941, proposed to be
 transferred in 1942 estimates
 to "Salaries and Expenses,
 Bureau of Agricultural Economics".... - 3,000
 Total available, 1941..... 247,000
 Budget estimate, 1942..... 247,000

PROJECT STATEMENT

Projects	1940	1941 (Estimated)	1942 (Estimated)
1. Forest survey	\$249,528	\$247,000	\$247,000
Unobligated balance.....	472	----	----
Total.....	250,000	247,000	247,000

WORK UNDER THIS APPROPRIATION

General. The work under this appropriation includes the first authoritative nation-wide field inventory of the forest resource, including an estimate of our present and potential requirements for forest products. Reports of this investigation are to furnish, in addition to the figures, an economic interpretation of the facts obtained, as a basis for the formulation of sound forest plans and programs. Extensive field and office work are both required.

The Forest Survey is currently obtaining forest resource information long desired and now vitally important as a guide in directing the course of national measures involving preparedness, conservation, and land use, such as balance of growth and depletion to build up growing stock and bring into effect sustained yield; correlation and distribution of industrial requirements with forest productive capacity of the soil; public acquisition of land for forest purposes; regulation of cutting practices on private lands; conversion of submarginal agricultural land to forests; Civilian Conservation Corps programs; development of permanent forest communities. In fact, the information is basic to a solution of all aspects of the whole forest problem. The accumulation and interpretation of data are far behind the current demand for information.

Objective: To determine for both public and private forest land the extent, quantity, quality, and kinds of timber and the condition of cutover land; rate of timber depletion from all causes; current and potential growth; and present and potential future requirements for forest products; analyze and interpret the relation of these findings to one another and to other economic factors as a basis for formulating policies, principles, and plans of forest land use and for a proper understanding of the forest situation.

The Problem: Since its settlement this Nation has been cutting its forests without knowing their volume, growth or the rate at which

they were being depleted. Because abundant forest resources are essential to our economic, social, and national welfare, and because signs of forest depletion are in evidence everywhere, it is deemed urgently necessary to determine the character, extent, and condition of the forest resource, and the drain on it, as a basis for plans which will assure a permanent supply of forest products.

Balancing the forest books is due. We can no longer safely draw on the forest capital without concern as to the volume of timber on hand, its growth, or the depletion that occurs from cutting, fire, and mortality.

Significance: Forests are a bulwark of defense. In war times they furnish essential materials, such as Sitka spruce for airplanes; in peace time they provide support for 5 to 6 million people each year. They supply materials for homes and help prevent erosion and floods. They furnish recreation for millions of people and shelter and food for a like number of game and livestock. One third of the area of the continental United States is forest land. These are some of the reasons why a systematic study and inventory of the forest resources is important--indeed, absolutely necessary to insure this country an abundant and permanent acreage of forests.

Plan and Progress of Work: As originally planned in 1928, this project is to cover all forest land in the United States--some 630 million acres. Both field work and compilation of data from a great variety of sources are required. Trained foresters, engineers, and economists cruise the timber, determine forest-products requirements, interpret the information, and prepare the reports. Mainly, the work is carried on at six of the regional forest experiment stations.

To date some 300 million acres have been covered, principally in the California, Pacific Northwest, Northern Rocky Mountain, Lake States, Southern, and Appalachian regions. Reports have been prepared for about three-fourths of this area and for a like proportion of the study of timber requirements. So far 160 reports and forest type maps for all or parts of 12 States have been prepared and released.

Along with the work of report writing for the area covered is the job of keeping the figures up to date. This phase is requiring an increasing amount of time as the acreage covered by the Forest Survey increases and cuts down seriously on the new area that can be inventoried each year with present appropriations.

Because of this work and the time required on report preparation, only 10 million acres were inventoried during the year with the appropriation of \$250,000, the maximum authorized by the Forest Research Act of May 22, 1928.



SUPPLEMENTAL FUNDS

Direct Allotments

Projects	Obligated, 1940	Estimated Obligations, 1941
<u>Emergency Relief, Agriculture,</u>		
<u>Forest Service (Transfer from WPA):</u>		
For projects in connection with		
research in forest survey:		
Forest survey: present and		
future requirements.....	\$6,030	\$1,864
Administrative funds included above :	115	---
Total Supplemental Funds		
(Direct Allotments).....	5,915	1,864

(m) FOREST ECONOMICS

Appropriation Act, 1941..... \$140,000
 Budget Estimate, 1942..... 140,000

PROJECT STATEMENT

Projects	1940	1941 (Estimated)	1942 (Estimated)
1. New public domain investigations.....	\$24,554	\$24,350	\$24,350
2. Financial aspects of forestry			
investigations.....	77,440	69,650	69,650
3. Stumpage, log, and lumber prices			
investigations.....	13,909	14,000	14,000
4. Range economics investigations.....	14,903	15,000	15,000
5. Economic-social benefits of forestry			
investigations.....	17,884	17,000	17,000
Unobligated balance.....	605	---	---
Total appropriation.....	149,295	140,000	140,000

The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a proper understanding of the present. The author then proceeds to discuss the various factors which have influenced the development of the United States, including the role of the government, the influence of the economy, and the impact of the culture. The author concludes by stating that the study of the history of the United States is a task of great importance, and that it is one which should be undertaken by all who are interested in the future of the country.

THE HISTORY OF THE UNITED STATES

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WORK UNDER THIS APPROPRIATION

General. What rules mankind should observe in order to advance in material prosperity and social security is a vital problem perpetually facing the Nation. As a contribution to its solution, the basic purpose of these forest economic studies is to make forests contribute permanently and in an increasingly greater degree to the welfare of society.

In correlation with other forest research, they strike directly at efficient and economical ways of attaining important forest land-use objectives upon which sound public forest policy and plans and industrial programs must be based. They also provide factual ammunition of value in understanding and in meeting the economic aspects of national defense.

More specifically, work under this appropriation deals with problems resulting from one-cut liquidation of our forest resources and from the wholesale abandonment of depleted land, ways of aiding unemployment through forest rehabilitation, costs and returns under sustained yield management, the formulation of practical methods of replacing destructive cutting with good forestry practice, conditions under which forest practice is financially feasible, prices of forest products, and with the economic aspects and distribution of range privileges on national-forest lands.

The work is divided among the following lines of activity:

Project 1. New Public Domain Investigations:

Objective: To determine the causes, extent, and trends of land reversion from private to public ownership in the various regions on account of non-payment of taxes; the desirable balance between public and private ownership; and ways and means of facilitating productive use of such lands as are suited to forestry.

The Problem: State and local governments throughout the country are in danger of being overwhelmed with large areas of unproductive land reverted to public ownership through tax delinquency. Accompanying this situation are decreased tax revenue and increased public responsibility because of unemployment and high hazard of unprotected, unclaimed land. How to meet this problem satisfactorily is the problem.

Significance: One of the most cherished tenets of a democracy is the privilege of owning property. Yet reversion of forest land, mostly cutover, to public ownership is taking place at an astounding rate in the Lake States, South, and West. It is estimated that at least 50 million acres of forest land has long been tax delinquent and may revert to public ownership. Upon the restoration of this land to a productive and revenue-producing condition and the replacement of tax revenue depend in large measure the welfare of the localities affected and the future of local forest industries.



Plan and Progress of Work: Studies of the reversion of private forest land to public ownership have been under way on a "shoe-string" basis for several years at the California, Pacific Northwest, Lake States, and Southern stations. Pertinent data obtained from county records on land ownership and shifts therein, valuation, taxes, delinquency, etc., have been compiled, analyzed, and correlated with other information about the forest conditions as a basis for trends, causes, and effects.

Information of this kind, along with advice as to how to meet local situations effectively, are in demand by State forestry commissions, State planning boards, county officials, chambers of commerce, Federal agencies acquiring land, and agencies and individuals interested in the reorganization and improvement of local government.

In addition to contributing importantly to such major State publications as the 600-page report of the University of Minnesota, "Taxation in Minnesota", "Land Utilization in Minnesota", by the Governor's Committee, "Forest Land Use in Wisconsin", by a similar State Committee, and the National Resources Committee report on the "Cutover Region of the Northern Lake States", information is being obtained and other important reports are being prepared in all the four regions studied. Supplementary to these major publications, numerous preliminary releases have proven very useful to local, State, conservation, and land-use planning agencies. This project contributes also to other studies concerned with land ownership and use, including the Forest Survey and the land-use studies of other bureaus, such as the Bureau of Agricultural Economics and the Soil Conservation Service.

Project 2. Financial Aspects of Forestry Investigations:

Objective: To appraise the financial aspects of private forest management for both large holdings and farm woodlands, and to develop financially practical ways and means of replacing destructive methods of exploitation with good forestry practice, including sustained-yield management. The studies are primarily concerned with the problems of private forest land, but they also contribute importantly to the formulation of sound management practices for public lands.

The Problem: Reliable information on the financial aspects of private forestry, especially the costs and returns of timber growing, is seriously lacking. It is not definitely known for the various regions where, under what conditions, and how, private forestry may be successfully practiced. An authoritative appraisal of the economic factors that are obstructing forestry practice, region by region and type by type, is needed. To overcome these obstacles, the development of new operating methods and other means, including needed public assistance, is necessary. One important phase of the private forest-land problem is the presence on the land of



four million farmers and other small forest landowners who are without the benefits of membership in associations and lack bargaining powers. Means must be developed to give them the benefits of collective action in managing their forests and in marketing the products therefrom.

Significance: Three-fourths of the commercial forest land (some 340 million acres and the most accessible and potentially most productive) is in private ownership. The crux of the Nation's forest problem is in these lands. Less than 10 percent of them is under even extensive sustained-yield management. More than 90 percent is handled without plan or concern for the future. The decision, whether to "mine" these forest lands or "crop" them rests increasingly heavier on the economic question, "Will it pay and how can it be made to pay?" and on the comparative cost and returns under different cutting practices and for processing methods. Authentic information from studies of the character covered by this project is therefore essential to the development of a sound forest economy which will stabilize and insure the livelihood of the millions of people dependent upon forest and wood-using industries.

Plan and Progress of Work: This project is now concerned primarily with two classes of forest land. One is the industrially owned private forest land, usually in fairly large blocks. Field work on this phase is done mostly at the Pacific Northwest and Southern Forest Experiment Stations. The other class is farm woodlands. Work on these lands centers at the Northeastern, Central States, and Lake States forest experiment stations. Trained foresters, economists and engineers conduct these studies. It is a continuing project designed to make periodic contributions as the results of the studies of the different phases of the broad problem become available. For the Northwest "Selective Timber Management in the Douglas Fir Region", which is a comprehensive publication from this study, is a good example. This bulletin presents the possibilities of sustained-yield practice on a light selection basis. In prospect for the Northwest is a report for ponderosa pine, which will advocate a revolutionary method of cutting in which a much smaller proportion of the stand is revived and a higher rate of sustained productivity is obtained. This conclusion is based on a series of studies covering an analysis of the values, costs, and returns in a number of ponderosa pine operations. Another study in the commercial forests is in southern pine and centers largely at the Crossett Experimental Forest, Crossett, Arkansas. Here, new cutting practices and operating methods have been devised and put into effect. Results indicate higher returns under light selection cuts, including higher grade products and higher rate of sustained productivity, both of which promote greater community stability. Progress reports are issued as results become available. An example is: "Costs and Returns of Managing 100,000 Acres of Shortleaf and Loblolly Pine for Sustained Yield." Findings of this work are receiving widespread attention and stand out as a guide post for private forest practice



on the shortleaf and loblolly pine forests in the South, as well as on national forests.

Ahead are studies to deal with the financial factors involved in the most effective integration of the different products of the crop, saw logs, poles, and especially pulpwood, which is an increasingly important outlet for forest products because of the recent and continuing expansion of the pulp and paper industry in the South.

Although basically the farm woodlot problem is somewhat the same in all regions, varying conditions of timber stand, local attitude of farmers, and available markets necessitate regional studies.

In the Northeast the work is designed to devise the best simple methods of economic organization which will give farmers and other woodlot owners the benefits of collective action in the management of their woodlands and in the manufacture and marketing of the products from them. Cooperstown, N.Y., was selected as the location for this work. A cooperative association was organized by local people under Departmental guidance, a Government loan obtained, and a manufacturing plant constructed. This, serving as a case study of the many and varied aspects all the way through from management on the ground to marketing, is in process. It is too early to present final results, but the principles behind the project are sound and prospects for valuable contributions to the field of forest co-operatives, the farmer's welfare, and to a well-rounded national forestry program are promising.

In the Central States and Lake States the work is in collaboration with selected State agricultural stations. Broadly, it involves a thorough analysis of the present and future place of farm woodlands in the agricultural economy of the agricultural Middle West. Indications are that the average return from woodlands per farm can be increased some 50 percent through improved management and marketing.

These studies are closely correlated with forest research in allied lines, such as silviculture and products.

Project 3. Stumpage, Log, and Lumber Prices Investigations:

Objective: To obtain current stumpage, log, and lumber prices by species, States, and regions; to develop price trends and indices; to study the relationships of trends to various economic factors; and to compare the prices and price trends developed with those of other commodities.

The Problem and Its Significance: To develop an authentic source of information on current stumpage and log prices by obtaining detailed reports of bona fide transactions; to obtain authentic average lumber prices.



Stumpage and log prices are important elements in the cost of lumber and other forest products. They are not compiled on a comprehensive or nation-wide basis by any other agency. They are essential to other important forest economics studies and influence the formulation and development of national, State, and private forest programs. Adequate and representative prices are the only sound basis upon which timber appraisals can be made. Average stumpage, log, and lumber prices also furnish an excellent check upon the values found by appraisal in individual cases. These data are valuable to both private and public agencies.

Plan and Progress of Work: Basic stumpage and log price data are collected annually through a cooperative agreement with the Bureau of the Census; lumber price data are obtained from trade associations. Current work includes the compilation and analysis of this information annually and the development of price trends and indices; comparison with price trends and indices of important agricultural crops; and the publication of an annual statistical bulletin of stumpage and log prices and of quarterly and annual mimeographed lumber price reports principally for intra-Forest Service use. This is an important and continuing project. Analysis and report preparation are done in Washington, but data are obtained through the field offices of the Forest Service and from other sources.

Project 4. Range Economics Investigations:

Objective: To determine for various conditions and combinations of livestock raising and agriculture what size range unit is best adapted for family economy and how national-forest range privileges can best be distributed.

The Problem: Overstocking of ranges, particularly of unregulated public and private range lands, has caused serious deterioration of the forage crop, resulting in increasing difficulties in economic livestock production. It has led to excessive demands upon the relatively small but key acreage of national-forest ranges. It is of vital importance that the privilege of range use, particularly of national-forest ranges, be neither unduly concentrated nor uneconomically dispersed. It must be distributed in a way that will contribute the most to prosperous family units, permanent communities, and, obviously, in accordance with the carrying-capacity of the land.

Significance: In the Intermountain region where the work is centered, 145 million acres of range land supports a livestock industry which produces about 30 percent of the total direct agricultural income, as well as contributes in a substantial way to local enterprise in some 60 supply towns and trade centers.

Plan and Progress of Work: This investigation will supplement on the economic side the program of range-management research authorized under Section 7 of the McSweeney-McNary Forest Research Act of 1928.



Commenced in 1938 at the Intermountain Forest and Range Experiment Station, the project was first centered on the Elko County cooperative study which was to analyze land-use adjustment problems and ranch commensurability records as a basis for public-land administration policies. Final report is expected in 1940.

Currently, the field work is in central Utah. Here the economic and social consequences of different alternatives which may be followed by public land administration in handling public lands for the grazing of farm and ranch livestock are being appraised. In cooperation with the Utah Agricultural College, a selected sample comprising some 600 farm and range units is being studied. In addition, farm and ranch contacts of the Agricultural Adjustment Administration are being analyzed to give a picture of the organization of all operating units and the uses of all crop lands.

Another line of inquiry is the analysis of all the Region 4 grazing permits and accompanying ranch property holdings. This is expected to give a regional picture of the relationship of different types of land resources to grazing preferences on different forests, and of the present situation regarding range distribution among the various size classes of livestock operations.

It is expected that this information will show the relation of public-land grazing use to the entire farm economy of the area and thereby help provide a basis for the most beneficial administration of these lands, in correlation with private grazing lands with other agricultural pursuits. Especially will it assist in obtaining the best distribution of national forests inquiry privileges.

Project 5. Economic-Social Benefits of Forestry Investigations:

Objective: To determine the present and future potentialities of forest rehabilitation and management, particularly as a means of relieving a critical unemployment situation and of contributing to economic well-being generally. The work is now limited to the Pennsylvania anthracite region.

The Problem and Its Significance: One and one-half million people, living on an area of 3 million acres, basically dependent on a single industry--the mining of hard coal--which is declining, present a serious social and economic situation currently accentuated by widespread unemployment. Idle men and idle land, side by side, focus attention on the possibilities of relieving both by rehabilitating the one great, renewable natural resource--the forests.

Plan and Progress of Work: This project is conducted by the Allegheny Forest Experiment Station. The work was commenced in the fiscal year 1940 with a new appropriation. A problem analysis was made and a work plan prepared. It calls for two lines of activity. The first is to prepare plans for promptly putting people to work rebuilding the forest. The second is to determine how much and how



best the social and economic welfare of the region can be enhanced once the forests are restored to productivity. Along with both phases there will arise subsidiary problems requiring attention.

To meet the immediate need for employment, plans for fire-line construction and other protective improvements have been completed and are available for W.P.A. labor assignments.

To serve as part basis for an understanding of the forest situation, a systematic line-plot forest survey of Luzerne County is being made. It is planned to study similarly other counties in the anthracite region.

Close collaboration with Region 7 and with local, State, and Federal agencies interested or working in this area is sought in the study and in the analysis of the broader economic-social aspects of the problem.

SUPPLEMENTAL FUNDS

Direct Allotments

Projects	: : Obligated, : 1940 :	: Estimated : obligations, : 1941 :
<u>Emergency Relief, Agriculture,</u>	:	:
<u>Forest Service (Transfer from WPA):</u> For	:	:
projects in connection with research	:	:
in forest economics:	:	:
(a) Financial aspects of forestry	:	:
investigations.....	: \$9,457	: \$2,924
(b) Range economics investigations....	: 1,126	: 348
(c) Economic-social benefits of for-	:	:
estry investigations.....	: 672	: 208
Total, above projects.....	: 11,255	: 3,480
Administrative funds included above....	: 214	:
Total, Supplemental Funds (Direct	:	:
Allotments).....	: 11,041	: 3,480

(n) FOREST INFLUENCES INVESTIGATIONS

Appropriation Act, 1941 \$135,000
 Budget Estimate, 1942 135,000

PROJECT STATEMENT

Projects	1940	1941 :(estimated):	1942 :(estimated):
1. Influence of forests on streamflow investigations	\$66,469	\$63,822	\$63,822
2. Utilization of water by trees, investigations of	41,289	41,305	41,305
3. Stabilizing soils investigations .	16,866	16,873	16,873
4. Effect of forest cover on climate, investigations of	14,474	13,000	13,000
Unobligated balance	54	..	..
Total appropriation	139,152	135,000	135,000

WORK UNDER THIS APPROPRIATION

General. The research under this program is directed to a determination of the effect on the water resource of forest, brush, or range cover, or of combinations of them, as found on the national forests and other forest or non-agricultural lands. Its purpose is to determine how and to what extent forest and related cover may serve as the major factor in providing satisfactory conditions of water flow on entire watersheds or important parts of watersheds and the conditions of its use, including the extent and manner of cutting and grazing, which will afford the best results. It seeks to ascertain how to deliver the maximum amounts of usable water for irrigation and municipal use. It is designed to furnish facts on the water resource and its behavior as a basis for determining policy and action by Federal, State, and other agencies. It searches for methods of manipulating natural vegetation to lessen high-water and increase low-water flow, to decrease turbidity and salinity of surface waters, to control the rate of snow melt, to reduce the draft of vegetation on the soil water, and to deliver water to underground reservoirs. It attempts to develop watershed treatments which decrease the amount of debris carried by streams and thus to safeguard public and private water enterprises--investments in which aggregate hundreds of millions of dollars--from damage due to sediments which impair the quality of water and make necessary great sums for maintenance operations.

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The problem is national in scope. Practically every watershed in the United States contains some portion of the 630 million acres of forest land or of the 585 million acres of non-forest range land, or both. The management and use of these lands and the physical improvements upon them, therefore, affect the domestic water supplies of a very large portion of our population, the regimen of practically all of our streams and the uses to which they may be put, and the navigability of our rivers and harbors, and may affect also the climatic conditions of our locality. The increasing demand for irrigation water throughout the West, the increasing interest in the water resources for recreation, the recognition of the possibilities of controlling siltation of streams and reservoirs, and the recurrent threat to health from polluted waters--these not only accentuate the problems caused by an increasing population and greater demands for water but also focus attention on the value and place of the forest and range cover and its relation to streamflow regulation and the national water resources. The management of this great area of land, therefore, greatly affects both the quantity and the quality of the water resource. The solution of these problems affects many of the 180 million acres in the national forests.

The earliest national forests were created from the public domain primarily to protect the source of water supplies. The Weeks Act of 1911 authorized the purchase of forest lands in the interest of navigation. The Clarke-McNary Act of 1924 authorized the acquisition of forest land for watershed protection. More recently, the Congress has passed other laws for purchasing lands within the national forests for flood and soil-erosion control. Even within the national forests, the Congress has authorized setting lands aside for the protection and preservation of municipal water supplies and for recreation where water is the dominant use.

The national, regional, and local drainage basin need for this research has been repeatedly pointed out by the National Resources Planning Board. Its earlier recognition of this need has been strongly reaffirmed by its recent action in emphasizing the importance of carrying forward such research even under the stress of current national emergency conditions, which will necessarily curtail many meritorious water-construction projects. Undoubtedly as the national crisis passes and employment slackens the Nation will undertake similar programs.

Although some work in forest influences has been conducted ever since the Forest Service was established, the present activity continues the investigations provided for in the Agricultural Appropriation Acts under various headings since 1931 for investigations and experiments to determine and demonstrate the influence of the vegetative cover characteristic of forest and range or other wild land, on water yield, water conservation, streamflow regulation, climate, and soil stability, and for developing measures to increase the effectiveness of the cover as an agent for controlling run-off and preventing erosion. Such investigations are authorized in the McNary-McSweeney Forest Research Act of 1926 (U.S.C. Title 16, Sec. 581). The work is carried on under the following projects:



1. Investigations of the Influence of Forests on Streamflow:

Objective: To determine the relation between the natural cover (forest, chaparral, range) on a watershed and the behavior of the streams, primarily as a basis for ascertaining the best management of the cover when water flow is involved.

Problem: The relation of natural vegetation to streamflow is complex. Its determination involves many phases of water behavior, including regularized flow, floods and low water flow, surface flow, underground waters, rate of snow melt, etc. Also involved are the effects of the use of and changes in the cover brought about by fire, cutting, grazing, reforestation, reseeding, etc. Also involved are the effects of different kinds of cover and even of covers of different species, since run-off and percolation may be affected by the kind of litter and its effect on the water-holding capacity of the soil.

Significance: Policies as to the use and management of many public and private forest and range lands have been based largely upon qualitative observations and studies as to the beneficial effects of the cover on streamflow. A common belief is that management of forest and range for the maximum production of timber and forage assures optimum conditions of streamflow. Great benefits to streamflow have been claimed for reforestation and forest protection; but, along with claims as to the beneficial effects of cover have come denials. Such disputes arise and continue because they are based upon the interpretation and generalization of inadequate data.

The magnitude of the costs and areas involved requires that the validity of conflicting viewpoints and beliefs be established on a substantive basis. Were the true facts known they might disclose that the interests of the water resource and public economy might well be served by modification of cutting and stand-improvement practices, reforestation and reseeding programs, recreation and game-management policies, and forage use and grazing methods on publicly owned watershed lands. They might also provide a better inter-regional basis for forest-land purchase programs and give direction to the kind, character, and location of land purchased, thus making public acquisition more effective in providing a means for correcting waterflow conditions.

Plans and Progress of Work: A national program of work under this project has been developed. This program outlines the problems, the conditions of cover in which the work should be undertaken, and the general approach needed. At the present time the annual expenditure for this project is around \$65,000, with some work under way at 8 stations. Varying amounts of relief labor have been used for needed construction on experimental forests.



2. Investigation of the Utilization of Water by Trees:

Objective: To determine the amount of water used by trees (and other natural vegetative cover) as a basis for managing or using the cover to obtain maximum yields of usable water.

Problem: Transpiration, or the draft on the soil water by vegetation, is one primary source of water loss on a watershed. Water-loving vegetation is presumed to require much more water to produce a pound of dry matter than desert grasses.

Through his ability to manipulate the cover, the forester has it in his power to affect the amount of water lost to the air. Among the problems needing solution are these: What vegetative types or species of plants are to be favored or to be suppressed on the watersheds; how tall or how old should the vegetation be allowed to become; should fire, cutting, or poisoning be used to keep the vegetation down and, if so, at what intervals and at what times; what period or season of treatment yields the most lasting results; and, finally, is the water saved in this fashion worth the cost?

Significance: Forests under humid conditions or with an abundance of water at their disposal are believed to consume from 10 to 25 inches of water a year; under arid conditions they may use only from 6 to 10 inches, and under extreme circumstances possibly less. Under comparable conditions minor vegetation may use nearly as much when water is available and as little as an inch or two a year under extremely arid conditions.

The problem is widespread; it exists in practically all the western United States where irrigation is practiced and where water supplies are inadequate. The problem is serious, for land-management policies and practices may have to be greatly modified on many thousands of acres of public lands. The problem is difficult, for every region has its own complex of soils, climate, and species. The problem is complicated by the many species, their habits of growth, rates of water utilization depending on climate and perhaps on the past abuse of the soil. The problem has been recognized by foresters and others interested in water supplies. Research in this field has been urged by local planning groups, the Bureau of Reclamation, and the Corps of Engineers, as well as by the National Resources Planning Board.

Plan and Progress of Work: The national program of forest influences research suggests work under this project in all the western regions and in some eastern ones. The empirical approach in general will be through the use of small watersheds, where the cover can be modified with measurable effect upon water yield. Such an approach is suited to determining the effect of different vegetative types, of different methods of changing the vegetation, and of different degrees of intensity in the method used.



Work is at present under way on a partial scale at 5 regional forest and range experiment stations, with an annual cost of \$41,305. Some of the construction costs involved in this study have been met from various relief funds.

3. Stabilizing Soils Investigations:

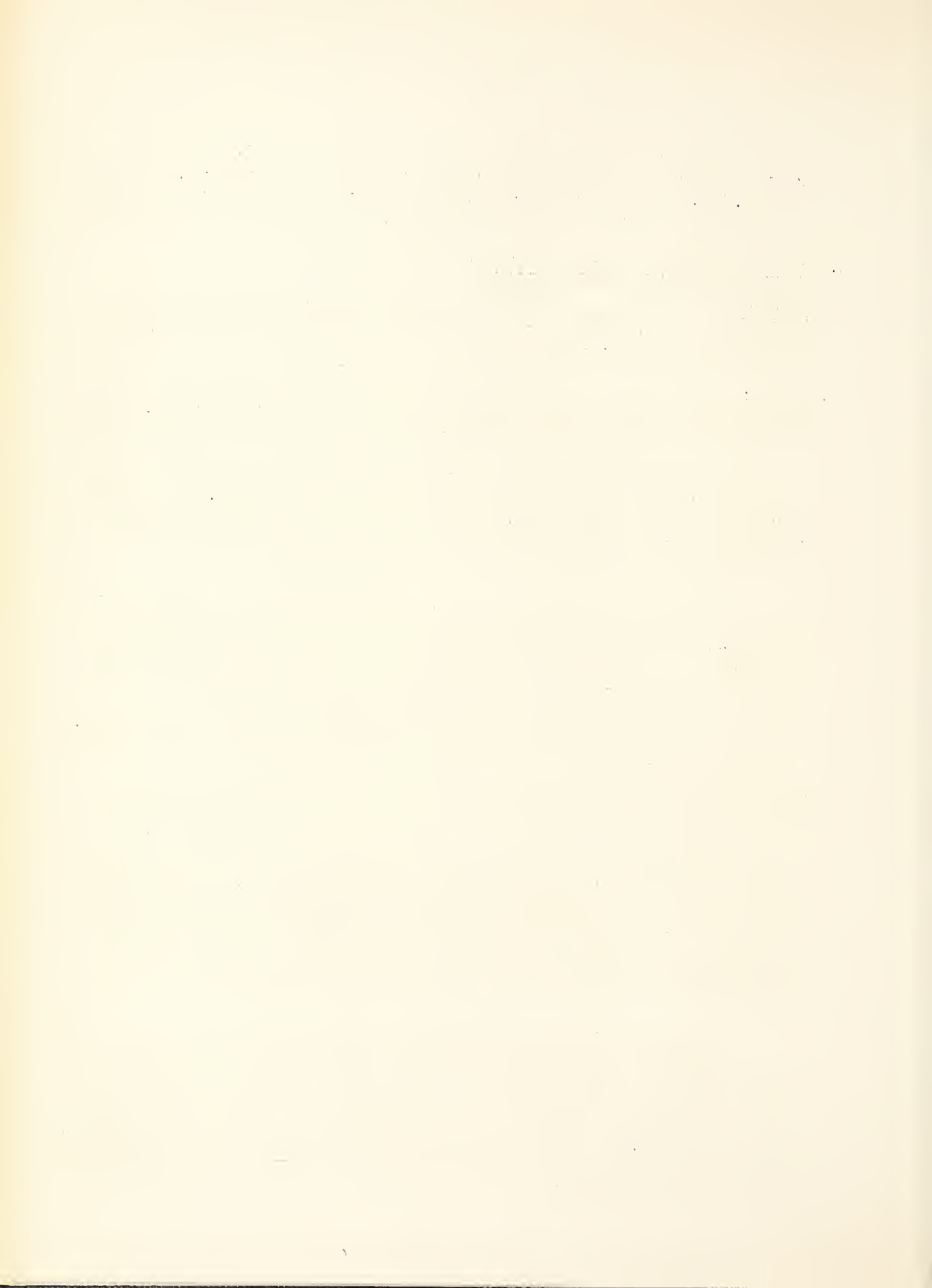
Objective: To determine methods by which soils characteristic of forests, ranges, and other wild lands may be made stable and erosion prevented and controlled.

Problem: The problem is one of preventing and of stopping soil losses on forest and range lands, especially on the national forests. Such losses are not common under the protective influence of the undisturbed natural cover and its concomitant litter but do occur as land or rock slides, avalanches, or slumps under some conditions of geology, topography, and climate. One phase of the problem, though not stressed now, is how to prevent these phenomena. Causal factors must be determined and the conditions under which they occur must be recognized.

Two problems must be solved: (1) Criteria and measurements must be devised by which critical conditions on forest and range lands may be diagnosed in the early stages so that preventive measures can be applied; and (2) simple and rapid, but cheap and efficient, methods of arresting and curing advanced cases must be developed. Chief dependence will of necessity be placed on natural vegetation, its use, management, and regeneration, with supplementary treatments only under extreme conditions.

Significance: The instability of the soil characteristics of wild lands is national in extent. The general effect of this condition on vegetative cover has been to lower or destroy the productive capacity of forest and range lands, impair the value of their water resources and their dependent fisheries and wildlife, and cause untold damage by deposition in rivers, on downstream lands, and in irrigation, power, navigation, and flood-control structures. It has damaged communities and caused loss of life. It has affected practically every forest and range region and every major river in greater or less degree.

The need for research is further emphasized by the results of the emergency efforts of the past few years. Large amounts of relief labor have been expended in soil stabilization--Federal, State, and local. Some work has been highly successful, but a large part has not been effective and many construction works have been lost. Furthermore, a large expenditure of funds on a trial-and-error basis always involves great wastes which could be avoided by the use of research techniques.



The Department has initiated an upstream program in the interests of flood control, in which the control of debris and soil movement from forest and range lands is an important factor.

Plans and Progress of Work: Emphasis has been given primarily to research on the causes of soil instability in forest and range lands (especially on the national forests) and to ways by which it could be prevented, and secondarily to methods of control. In prevention it has been pointed out, for example, that the need in some national forest areas is for intensified fire control where erosion hazards are greatest; that stock reductions are needed beyond those necessary merely for good range management; that better planning of mountain roads before construction would reduce maintenance costs; and that mustard sowings on southern California burns can prevent great damages from debris flows.

The effort in control is to develop practicable measures which would utilize natural vegetation and native materials. That the measures have been practical is demonstrated by the fact that successful control work has followed research prescriptions.

At present, the work on this project is under way at 4 stations with total annual expenditure of close to \$17,000. Most of the work is being done or will be done on experimental areas, publicly owned, usually in connection with other work. None of the work contemplated under this project conflicts with or duplicates that of any other agency.

4. Investigations of the Effect of Forest Cover on Climate:

Objectives: To determine the effect of forests (and other natural vegetation) on the climate of the locality and on the various climatic factors.

Problem: Forests are believed to have a real effect on climate. This belief ranges from the theory that deforestation has been the cause of droughts, and that reforestation has had the effect of increasing rainfall. The problem is twofold: (1) to determine the effect of forests on the climatic factors of a locality, and (2) to determine how forests can be used to the best advantage to temper local climates.

To what extent and how do forests affect local climates? How much precipitation is lost to the air through evaporation following rains? How much intercepted rain gets to the ground by running down the stems and trunks? Do forests aid in accumulating and preserving the snow cover in its distribution and its winter pack? Do they delay melting and, if so, under what kind of canopy? Do forest soils freeze more deeply than other soils and, if so, under what conditions of density or composition? Do forest soils freeze under litter and snow and, if so, how deeply and for how long?



What is the effect of different types and conditions of forest on local humidities, temperature, evaporation, and wind velocity within the forest and outside? How effective are windbreaks in reducing the velocity of wind and evaporation, in obtaining uniform distribution of snow cover over the fields, and in obtaining greater crop yields? What character of windbreak is best, how high should it grow, how dense; how wide should it be, what species should be used; what is the effect of thinnings on the local climate?

Significance: The solution of such problems has economic value. Late irrigation water has much higher value than early water. In the management of national forests where snow water is important, cuttings might be made so as greatly to increase the snow catch, reduce evaporation and interception losses, and delay the melting. The opposite may be in effect now.

Thousands of windbreaks and shelterbelts have been planted. As these develop some trees will be suppressed. Thinning might prevent serious holes in these stands due to suppression. Also a properly thinned stand might serve to cause more wind turbulence than a dense stand and hence be of greatest value. But how deep should a windbreak be to provide maximum beneficial results? How far apart should windbreaks be planted to break up the winds over a large area?

Plans and Progress of Work: Most of the work under this project is incidental to other activities and hence is not a major activity. Planned work is under way at only 3 Forest Experiment Stations, with observations at 6 others. It is planned to maintain this project on its present basis with an annual expenditure of about \$14,000.



SUPPLEMENTAL FUNDS

Direct Allotment

Projects	:	:
	: Obligated,	: Estimated
	: 1940	: 1941
	:	:
Emergency Relief, Agriculture, Forest Service	:	:
(Transfer from WPA): For projects in con-	:	:
nection with research in forest influences:	:	:
	:	:
1. Influence of forests on streamflow	:	:
investigations	: \$108,193	: \$33,451
2. Utilization of water by trees inves-	:	:
tigations	: 17,517	: 5,416
3. Stabilizing soils investigations	: 42,531	: 13,150
4. Effect of forest cover on climate	:	:
investigations	: 19,518	: 6,032
	:	:
Total, above projects	: 187,759	: 58,049
Administrative funds included above	: 3,577	: ..
	:	:
Total, Supplemental Funds (Direct	:	:
Allotments)	: 184,182	: 58,049
	:	:

(o) FOREST-FIRE COOPERATION

Appropriation Act, 1941	\$2,200,000
Allotment 1941, proposed to be transferred	
in 1942 estimates to "Salaries and Ex-	
penses, Bureau of Agricultural Economics"	- 10,000
Total available, 1941	2,190,000
Budget estimate, 1942	2,430,000
Increase	<u>300,000</u>



PROJECT STATEMENT

Projects	1940	1941	1942	Increase
		(estimated)	(estimated)	
1. Cooperation with States in:				
forest fire prevention and :				
suppression	\$2,153,299	\$2,145,000	\$2,445,000	+\$300,000 (1)
2. Forest taxation and in-				
surance investigations ... :	43,715	45,000	45,000	..
Unobligated balance	2,986	..	..	..
Total	2,200,000	2,190,000	2,490,000	+ 300,000

- (1) An increase of \$300,000 to extend cooperative protection against forest fires to unprotected private forest lands and to increase the adequacy of protection given to State and private lands now under some form of organized protection, as follows:

Objective: To more adequately protect from fire State and privately owned forest lands.

The Problem: The Federal Government is now cooperating with 41 States and Hawaii in protecting 279 million acres of forested lands. Such protection has been effective, but the standard of protection on a large proportion of the area is too low and needs strengthening. 149 million acres--an area more than 3-1/2 times as large as New England--is without any protection to speak of. The problem is twofold:

- (a) To increase the effectiveness of the present effort on protected areas.
- (b) To extend protection to present nonprotected areas.

Forest conservation begins with protection of the forest against fires. Even today woods fires are the Nation's forest enemy number one. They are the greatest single agency in the useless destruction of the forest resources of the Nation. Not only do they destroy our forest wealth, but they create conditions favorable to soil erosion, floods, and the drying up of water courses. The huge annual damage from forest fires can and must be greatly reduced. Since adequate national defense may well depend upon our natural resources, it is manifestly unwise to needlessly allow forest fires to continue their enormous annual destruction of our national wealth.

Significance: The States and private owners are unable to effectively protect their forest lands without Federal assistance. Because of the many public benefits from forests and the fact that the public is responsible for most of the fires, the Federal Government has a real stake in fire protection and should help. This principle was recognized in the enactment of the

Clarke-McNary Law in 1924. Federal aid under this Act has been a potent stimulant in organizing and building up State protection agencies and in increasing area under protection from less than 160 million acres in 1924 to 279 million in 1940. During 1939, 57 percent of all fires and 80 percent of all damages on private and State forest lands were on the unprotected one-third of such lands. Damages on unprotected lands were estimated at about \$29,000,000. If such lands were protected and under the same standards as the present protected areas, an annual saving of about \$25,000,000 could have been made.

Plan of Work: The increase requested in the 1942 budget estimates will be used to give better protection to areas now inadequately safeguarded and to extend protection into some parts of the vast unguarded areas. In order to receive such funds the State must match them with State and private money. The plan of operation will be an expansion of the existing cooperative program with the State protective agencies. The fire protection problem is especially serious in the Southern States and in the Far West region.

WORK UNDER THIS APPROPRIATION

General. The work under this appropriation is concerned with the protection of forest lands in State and private ownership from forest fire, in the interests of watershed protection, timber production, and other forest values, and with the study of taxation and insurance problems applicable to forest lands. The work is divided along the following lines of activity:

Project 1. Cooperation with States in Forest Fire Prevention and Suppression:

Objective: To furnish adequate protection from forest fires to 423 million acres of forest and watershed land which are in State and private ownership.

The Problem: One-third of the above area is not now under any form of organized protection. The problem is to put this unprotected land under protection, as well as to raise the standard of protection on areas now under protection. Approximately fifteen times as great an area is burned on unprotected forest lands as on protected areas--this despite the fact that the protected area is twice the size of the unprotected area. To reduce the tremendous losses in a valuable natural resource, adequate fire protection must be extended to cover all forest lands. Federal aid is both warranted and needed in the cooperative protection of these lands.

Significance: Protection from forest fire is the first requisite in the conservation of the forest resource. Without fire control enormously valuable resources are sacrificed. Each year there are some



200,000 forest fires on State and privately owned forest lands. During 1939 there were 200,315; the average for the five-year period 1935-1939 was 189,286. The number of forest fires increases as the recreational use of forest lands increases. In 1939 fires on unprotected areas constituted 57 percent of the total number of fires; but 89 percent of the area burned and 80 percent of the damage caused was on these unprotected lands. The reason is obvious. Organized protective forces were on hand in the protected areas to take prompt action.

Without fire control, resources of great value are destroyed. In 1939 the tangible damage from forest fires on State and privately owned lands was nearly \$37,000,000. Slightly less than \$8,000,000 of this damage was on the protected lands (two-thirds of the total area), while 80 percent of the loss was on the one-third which was unprotected. In 1939 the Federal Government expended seven-tenths of one cent per acre in cooperating with the States in forest-fire prevention on 280,000,000 acres of State and privately owned forest lands. Damage from forest fire on these protected lands was held to 2.8 cents per acre, as contrasted to damage on unprotected lands of 19.4 cents per acre. The value of protection is shown by the fact that only 1.17 percent of the protected area was burned over, as compared with 17.92 percent for the unprotected area.

All but seven States cooperate in this program, and in one of these seven States (Utah) surveys are under way leading toward participation in the program. In the participating States, Federal aid and leadership is the backbone of the entire program of cooperative forest fire protection. It stimulates State legislative action in making available State funds for fire control and it gives stability to trained fire protection organizations. The protection job is a public responsibility, and public administration, involving the police powers of the State, alone can promise success with economy.

The States appreciate the need for adequate forest-fire protection. Since 1926 appropriations made by the States and the contributions by private land owners have made a steady and substantial increase. In 1926 the States appropriated a total of \$1,611,380; by 1939 it had risen to \$5,133,107. In 1926 private contributions were only \$263,512; by 1939 they had increased to \$1,556,202. The total amounts from both sources had increased from \$1,874,892 in 1926 to \$6,689,309 in 1939. When Congress enacted the Clarke-McNary Law in 1924, it recognized the public responsibility for assisting in fire control. The Federal Government in its intended 50 percent participation has not kept pace with the increasing funds made available by the States and private agencies.

Plan of Work: The cooperative fire protection program is administered on the ground by the States under plans developed jointly by Federal and State agencies. Each State annually presents a budget showing State and other funds set up for the work. Adequate protection involves organizing men, equipment, and materials for the prevention



of forest fires by means of educational work; the quick detection of fires through the operation of lookout towers and the employment of fire patrolmen; the suppression of fires (involving the development and use of mechanized equipment, and at times the employment of very large numbers of men); and the establishment of necessary improvements for communication and transportation. Adequate inspection is made by the United States Forest Service to see that high standards of organization and compliance are maintained. Grants to the individual States are made on a reimbursement basis, following initial expenditure by the State. Every dollar given in grant by the Federal Government must be matched by the State and private cooperators, and definite evidence of actual expenditure is required before reimbursement is made. An appropriate formula is followed in computing grants to States to insure non-partiality and that grants are made on the basis of estimated cost of adequate protection in each State and the degree of State performance.

2. Forest Taxation and Insurance Investigations:

Objective: To advance private forestry by aiding States and local governments, through research and cooperative assistance, to achieve more equitable taxes on forestry property; and to aid in making fire insurance available to forest owners at reasonable cost.

The Problem and Its Significance: The tax problem is recognized as a critical element in forest land management, and in many localities present methods of taxation are an obstacle to the practice of forestry on private lands. Interest in forest taxation is widespread on the part of forest owners, State and local authorities, and the agencies concerned with conservation and development of forest resources. There is urgent demand for aggressive Federal assistance in obtaining forest-taxation reform in many States in order to help make private forestry practicable.

Forest tax reform comes slowly, considering the country as a whole, not only because of the inertia that follows from conflicting interests among taxpayer groups but also because the problem is complex. If a specific reform is to be adequate and lasting, it must be a method of taxation that is equitable as between forests and other types of property, that does not disrupt the financing of local government, and that is in harmony with the State constitution. In conducting studies and in formulating proposals much weight must be given to the peculiar local requirements; but progress, even though slow, is being made, and the need for continued and intensified Federal effort is urgent.

There is pressing need for a system of forest fire insurance that reduces the hazards in private forestry to an insurable risk. The feasibility of such insurance has been shown by past studies, and the project is now largely in the educational stage.



Plan and Progress of Work: Forest taxation work has been carried through the initial stage of development of fundamental principles of sound forest taxation and has advanced to the stage of research aimed at application of such principles. These application efforts require studies and consultation, in cooperation with State and other agencies, to supplement and effectuate the conclusions and general methods already determined and to adapt them to the widely varying conditions of individual States. Most field investigations are made at the request of State officials, but some studies are made to provide information and basic data of nation-wide significance. Efforts are required along many and varied lines, including cooperation with the Bureau of Agricultural Economics and other land-use planning agencies and investigation of the fiscal relations of the national forests with local governments.

Activities during recent months include the issuing of a comprehensive digest of State special forest tax laws, together with data on the extent of their application; giving cooperative assistance prior to the enactment of new forest tax laws in Mississippi and Ohio; completing and publishing a study of forest taxation in Michigan; submission of a report on forest taxation to the North Carolina Classification Amendment Commission, which report has led to the formulation of a specific forest tax measure which is now before the North Carolina General Assembly; publication of a bibliography of available literature bearing on forest taxation; making of a survey of instructions and aids relating to the technical problems of assessing forest property that are now available to assessment officials in the 48 States; and development of a new plan of contributions to local governments in lieu of taxes on national-forest lands, including aid to the Federal Real Estate Board in adapting this plan to apply to all Federal conservation lands. A first issue was also made of tax index figures on forest lands in Mississippi, the favorable public reception accorded this release (75 letters of commendation from over the entire country) indicating the desirability of developing forest tax index data for other States as rapidly as funds permit.

Educational efforts are in process looking to the establishment of an adequate and economical system of forest fire insurance. Additional basic studies may be desirable at a later date but are not contemplated for next year.

The following table shows, by States, the Federal allotments compared with contributions by State and private agencies for forest fire cooperative work under the provisions of Section 2 of the Clarke-McNary Act.

STATE ALLOTMENT DATA
FOREST FIRE COOPERATION UNDER SECTION 2 OF THE CLARKE-McNARY LAW

State	: State and private : : funds budgeted, : : fiscal year 1941 :	Federal allotments, fiscal year 1941
Maine	\$160,097	\$43,827
New Hampshire	143,796	17,819
Vermont	26,109	6,147
Massachusetts	202,199	35,428
Rhode Island	23,091	2,225
Connecticut	72,874	17,261
New York	463,397	63,096
New Jersey	145,103	33,592
Pennsylvania	259,080	47,255
Delaware	8,990	1,943
Maryland	50,691(a)	12,332
Virginia	99,017	39,513
West Virginia	150,675	35,529
Kentucky	18,100	18,100
North Carolina	125,257	65,447
South Carolina	189,845	49,598
Georgia	170,912	77,220
Florida	260,361	103,798
Alabama	195,782	57,036
Mississippi	100,301	51,159
Louisiana	290,425	55,894
Texas	101,949	49,431
Oklahoma	21,515	16,506
Arkansas	128,431	57,206
Tennessee	60,065	28,921
Michigan	520,302	128,554
Wisconsin	461,119	93,381
Minnesota	357,195	93,043
Ohio	29,971	7,906
Indiana	63,679	9,086
Illinois	23,080	5,543
Missouri	17,050	13,950
Montana	135,792	23,864
Idaho (North)	162,505	45,765
Idaho (South)	29,861	8,465
South Dakota	2,650	1,121
Colorado	3,750(a)	2,150
New Mexico	12,881	3,990
California	955,429(a)	224,906
Nevada	8,936	2,165
Hawaii	5,933	1,229
Washington	1,219,831(a)	171,304
Oregon	648,266	157,354
Total allotments to States	8,126,292	1,980,059
Administration, inspection, and contingent expenses		174,941
Forest Taxation and Insurance Project		45,000
Total appropriation		2,200,000

(a) Fiscal year 1940 figures.

Date	Description	Debit	Credit	Balance
1890				
Jan 1	Balance forward			100.00
Jan 5	Wages	5.00		95.00
Jan 10	Food	2.00		93.00
Jan 15	Medical	1.00		92.00
Jan 20	Transport	3.00		89.00
Jan 25	Utilities	1.50		87.50
Jan 30	Insurance	2.50		85.00
Feb 5	Wages	6.00		79.00
Feb 10	Food	2.50		76.50
Feb 15	Medical	1.50		75.00
Feb 20	Transport	3.50		71.50
Feb 25	Utilities	1.75		69.75
Feb 30	Insurance	2.75		67.00
Mar 5	Wages	7.00		60.00
Mar 10	Food	3.00		57.00
Mar 15	Medical	2.00		55.00
Mar 20	Transport	4.00		51.00
Mar 25	Utilities	2.00		49.00
Mar 30	Insurance	3.00		46.00
Apr 5	Wages	8.00		38.00
Apr 10	Food	3.50		34.50
Apr 15	Medical	2.50		32.00
Apr 20	Transport	4.50		27.50
Apr 25	Utilities	2.25		25.25
Apr 30	Insurance	3.25		22.00
May 5	Wages	9.00		13.00
May 10	Food	4.00		9.00
May 15	Medical	3.00		6.00
May 20	Transport	5.00		1.00
May 25	Utilities	2.50		(1.50)
May 30	Insurance	3.50		(5.00)
Jun 5	Wages	10.00		(15.00)
Jun 10	Food	4.50		(20.00)
Jun 15	Medical	3.50		(24.00)
Jun 20	Transport	5.50		(29.50)
Jun 25	Utilities	2.75		(32.25)
Jun 30	Insurance	3.75		(36.00)
Jul 5	Wages	11.00		(47.00)
Jul 10	Food	5.00		(52.00)
Jul 15	Medical	4.00		(56.00)
Jul 20	Transport	6.00		(62.00)
Jul 25	Utilities	3.00		(65.00)
Jul 30	Insurance	4.00		(69.00)
Aug 5	Wages	12.00		(81.00)
Aug 10	Food	5.50		(87.00)
Aug 15	Medical	4.50		(92.00)
Aug 20	Transport	6.50		(98.50)
Aug 25	Utilities	3.25		(102.00)
Aug 30	Insurance	4.25		(106.50)
Sep 5	Wages	13.00		(120.00)
Sep 10	Food	6.00		(126.00)
Sep 15	Medical	5.00		(131.00)
Sep 20	Transport	7.00		(138.00)
Sep 25	Utilities	3.50		(142.00)
Sep 30	Insurance	4.50		(146.50)
Oct 5	Wages	14.00		(161.00)
Oct 10	Food	6.50		(167.50)
Oct 15	Medical	5.50		(173.50)
Oct 20	Transport	7.50		(181.50)
Oct 25	Utilities	3.75		(185.50)
Oct 30	Insurance	4.75		(190.50)
Nov 5	Wages	15.00		(206.00)
Nov 10	Food	7.00		(213.00)
Nov 15	Medical	6.00		(219.00)
Nov 20	Transport	8.00		(227.00)
Nov 25	Utilities	4.00		(231.00)
Nov 30	Insurance	5.00		(236.00)
Dec 5	Wages	16.00		(252.00)
Dec 10	Food	7.50		(259.50)
Dec 15	Medical	6.50		(266.50)
Dec 20	Transport	8.50		(275.50)
Dec 25	Utilities	4.25		(280.00)
Dec 30	Insurance	5.25		(285.50)
Total		1000.00	1000.00	

(p) NEW ENGLAND HURRICANE DAMAGE

Appropriation Act, 1941	\$300,000
First Deficiency Act, 1939 (available balance for 1941 from 1939 appropriation of \$5,000,000 for hazard reduction and fire prevention in New England States)	869,236
Total available, 1941	1,169,236
Budget estimate 1942 .....	..
Decrease	<u>1,169,236</u>

PROJECT STATEMENT

Project	1940	1941 :(estimated):	1942 :(estimated):	Decrease
For rehabilitation and re- establishment of forest protection improvements, reduction of fire hazards, and prevention of forest fires, New England States...	\$3,659,566(a)	\$1,169,236	..	\$1,169,236(1)

(a) Appropriated by First Deficiency Act, 1939; \$471,198 expended in fiscal year 1939.

DECREASE

- (1) The decrease of \$1,169,236 in this item is brought about by the discontinuance of Federal participation in the special hazard reduction and fire prevention program in the New England States resulting from the hurricane of September 21, 1938. It is anticipated that continuance of the fire-hazard reduction work beyond June 30, 1941, can be carried on by State agencies and that, therefore, a Federal appropriation for fiscal year 1942 will not be necessary.

WORK UNDER THIS APPROPRIATION

Objective: To reduce or eliminate the unprecedented forest fire hazard existing in the New England States as a result of the September 1938 hurricane.

The Problem: Reduction of the forest fire hazard in the New England hurricane area so as to give protection to life and property and eliminate the danger of forest fires of a catastrophic nature.

Significance: As an aftermath of the hurricane of September 1938, vast areas of timberlands in the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, and New York were seriously damaged and millions of trees blown down. An extraordinary fire hazard was created, one which was a constantly increasing menace to the area. As the windthrown timber and forest debris dry out they become extremely inflammable and bring about the danger of large and disastrous conflagrations. Adequate measures for the cleaning-up of the area to a degree which will insure safety are essential in the public welfare. In addition to the protection of life and property, it should be recognized that much of the commercial timber in New England upon which many industrial plants and communities depend has been blown down, and it is particularly important that a residual timber here and there and the young growth, upon which communities and plants of the future must depend, be protected from serious fires. Neglect of existing forest debris is a serious menace to the remaining timber and young growth in many places.

Plan and Progress of Work: A closely coordinated program, with the use of all available man-power, including WPA, CCC, and others, was essential. Crews of workers were placed in those areas where it was not possible or practicable to place CCC enrollees or WPA workers. In addition to the actual work of fire hazard reduction carried on by these Federal crews, their very presence in the wooded areas prevented what might have otherwise been serious fires. They were repeatedly called on to fight forest fires, and in the case of a fire near Sharon, New Hampshire, were influential in preventing a disastrous conflagration which might have destroyed the town.

At the peak of the work a complete field organization was necessary, including a State headquarters, with a State project director, in each of the States affected. As the work progressed and existing conditions were more or less alleviated, the organization was contracted and all field administration carried on from the project headquarters at Boston, Massachusetts.

(q) ACQUISITION OF LANDS FOR NATIONAL FORESTS

Appropriation Act, 1941	\$1,000,000
Transferred in 1942 estimates to "Salaries and Expenses, Bureau of Agricultural Economics"	- 12,000
Total available, 1941	988,000
Budget estimate, 1942	1,988,000
Increase	<u>1,000,000</u>

1. The first part of the paper discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the success of any business and for the protection of the interests of all parties involved. The author argues that without accurate records, it is impossible to make informed decisions or to identify areas for improvement.

2. The second part of the paper describes the various methods used to collect and analyze data. It discusses the advantages and disadvantages of different techniques, such as surveys, interviews, and focus groups. The author also discusses the importance of ensuring the reliability and validity of the data collected.

3. The third part of the paper presents the results of the study. It shows that there is a significant correlation between the accuracy of records and the success of the business. The author also identifies several factors that can lead to inaccurate records, such as lack of training, poor communication, and inadequate resources.

4. The fourth part of the paper discusses the implications of the findings for practice. It suggests that businesses should invest in training and resources to ensure that their records are accurate. It also suggests that businesses should implement a system of checks and balances to ensure that the data is reliable and valid. The author concludes that accurate records are essential for the success of any business and for the protection of the interests of all parties involved.

5. The fifth part of the paper discusses the limitations of the study. It acknowledges that the study was limited to a small sample of businesses and that the results may not be generalizable to all businesses. The author also acknowledges that the study was limited by the methods used to collect and analyze the data.

6. The sixth part of the paper discusses the future research. It suggests that future research should focus on developing more effective methods for collecting and analyzing data. It also suggests that future research should focus on identifying the factors that lead to inaccurate records and on developing strategies to address these factors.

7. The seventh part of the paper discusses the conclusions. It concludes that accurate records are essential for the success of any business and for the protection of the interests of all parties involved. It also concludes that businesses should invest in training and resources to ensure that their records are accurate. The author also concludes that businesses should implement a system of checks and balances to ensure that the data is reliable and valid.

8. The eighth part of the paper discusses the references. It lists the sources used in the study, including books, articles, and websites. The author also lists the names of the people who assisted in the study.

9. The ninth part of the paper discusses the appendix. It includes a list of the questions used in the surveys and a list of the names of the people who participated in the focus groups.

PROJECT STATEMENT

Projects	1940	1941	1942	Increase
		(estimated)	(estimated)	
Acquisition of lands for				
national forests	\$2,857,648	\$928,000	\$1,908,000	+ \$980,000(1)
Transfer to "Office of the				
Solicitor"	115,499	60,000	80,000	+ 20,000(1)
Unobligated balance	21,853	..	..	..
Total appropriation ...	2,995,000(a)	988,000	1,988,000	+1,000,000(1)

(a) Excludes \$5,000 transferred to "Salaries and Expenses, Bureau of Agricultural Economics."

INCREASE

- (1) An increase of \$1,000,000 in this item for 1942 is recommended to accelerate the purchase of land for national forest purposes, as authorized by the Act of Congress approved March 1, 1911, as amended (16 U.S.C. 513-519, 521).

Objective: To place in Federal ownership additional lands chiefly valuable for forest purposes within 76 national forests and purchase units in 31 States and Puerto Rico, in which the National Forest Reservation Commission has authorized the purchase of lands under the provisions of the Act of March 1, 1911, as amended (16 U.S.C. 513-519, 521), and to so protect and manage such lands as adequately to safeguard the watersheds of navigable rivers and streams and insure future timber supplies.

Problem and Significance: The public benefits to be derived from the early acquisition of private lands within established purchase units will exist in relation not only to the lands to be acquired but also to those hitherto acquired. The protection, utilization, and management of the private lands seldom is compatible with the public objectives of national forest administration; too often it definitely is negative to such objectives. Lack of fire prevention increases fire risks and losses. Uneconomic utilization of natural resources reduces the social and economic value of the resources in public ownership. Control of private lands often controls related public resources or forces compromises of their most effective use or equitable distribution. Measures to prevent encroachment on either public or private holdings add greatly to costs of administration. Increased values created by public action are inequitably capitalized by private interest. Only by more complete ownership and control will it be possible for the United States effectively to realize the purposes for which the purchase units were created, namely, to protect watersheds of navigable streams, assure continuous supplies of timber for

national needs, minimize flood damage and soil erosion, retire submarginal lands from present uneconomic uses, perpetuate and enlarge employment opportunity to local residents, afford adequate recreational opportunity, maintain habitats favorable to wildlife resources, and reduce losses due to fire, insects, and disease--all at a minimum of public expense.

Plans and Progress of Work: During the period 1911-1941, inclusive, the total amount appropriated by Congress and allotted from emergency funds for the acquisition of forest lands in the 76 units aforementioned is \$89,190,690, of which \$5,761,018 has reverted to the Treasury, leaving a net of \$83,429,672 expended for forest lands and costs incident to their purchase. These appropriations and allotments have made possible the acquisition by the Government of 17,331,167 acres.

The \$1,000,000 increase recommended for the fiscal year 1942 is estimated to permit the purchase of approximately 228,000 acres of land. It will be employed for the purchase of key areas which control the use of surrounding land and such other lands as will, in government ownership, best meet the objectives of the program of land acquisition for national-forest purposes. It is estimated that approximately \$912,000 thereof will be used for the purchase cost of land and that the expense incident to purchase, such as examination and appraisal of lands, abstracting and reviewing titles, procuring curative data, and general clerical and administrative expenses, will require approximately \$88,000.

WORK UNDER THIS APPROPRIATION

General. The work under this appropriation is concerned with the acquisition of land by the Government for national-forest purposes, as authorized by the Act of Congress of March 1, 1911 (36 Stat. 961), as amended particularly by the Act of June 7, 1924 (43 Stat. 653), for the protection of the watersheds of navigable rivers and streams, and to provide an adequate timber supply for the United States.

Objective: To vest in Federal ownership all lands chiefly valuable for forest purposes within the 76 national forests and purchase units in 31 States and Puerto Rico, in which the National Forest Reservation Commission has authorized the purchase of land under the provisions of the above-mentioned Acts, and to so protect and manage such lands as adequately to safeguard the watersheds of navigable rivers and streams and insure future timber supplies. Rehabilitation of blighted regions, prevention of timber devastation, and promotion of the production and protection of wildlife are collateral consequences of the basic purposes.

Problem and Significance:

Watershed protection: The navigability of river channels is largely dependent upon the maintenance of natural conditions of water and soil stabilization at the headwaters of such rivers.

Devastating floods pouring large amounts of silt into river channels are augmented in large degree by the misuse of privately owned lands on the headwaters. Heavy cutting of timber, forest fires, and overgrazing have greatly impaired the absorptive capacity of the soil, thereby contributing to flood-water conditions. The restoration of forest lands to their natural state and normal high capacity to absorb precipitation is essential to the maintenance of navigable rivers.

Timber supply: Public acquisition and management of established forests and the restoration of forests on lands more valuable for forest than for other purposes are essential steps to insuring an adequate supply of raw forest materials for the future. This is particularly evident in such regions as the Lake States, where entire areas have been depleted of their available timber resources by private operators or owners of the lands, with no provision of a well-planned restoration of depleted timber supplies and no assurance that the timber needs of future generations will be adequately met. The diminution of the natural resources of such areas has contributed tragically to the rapid deterioration of the economic and social welfare of the communities dependent upon the forests for livelihood. Private operators cannot well afford to embrace a program requiring the freezing of capital over a long period of time until new forest crops can be harvested and investments liquidated. Public acquisition therefore becomes necessary. Only a few of the States have adequate public forest programs. The Government's share of the total job logically includes lands of high national importance for watershed protection and timber growth.

Rehabilitation: Many people in the United States are dependent in whole or in part on the forests for their livelihood. The national forests can and do provide full-time employment for many thousands residing within or adjacent to the forests, and the incomes of many other thousands are supplemented by part-time employment. In areas in which the forests have been largely denuded the opportunities for employment have been destroyed, with attendant decrease in the social and economic status of the residents of such areas. The restoration of these areas to their former and possible productive capacity of natural resources will contribute to the return of desirable social and economic standards for the people. This has already proven true in many areas in which national forests have been established under the Act of June 1, 1911.

Wildlife: The need for scientific management of forest lands as a vital factor in the protection and production of wildlife is evidenced by the diminution of wildlife in areas where forest lands have been almost entirely denuded of trees and vegetal cover. The management given to the forests established by appropriations under the Weeks Law has contributed, and will continue to contribute, to the restoration, protection, and production of game and other wildlife.

General: The conservation of natural resources and the restoration to their highest productive capacity of denuded lands primarily valuable for forestry, requires the application of scientific management, adequate protection from fire, and regulated use of the resources of the land. Experience has proven that over a long period of time such management and protection may be feasible only under public administration. The owners of private land, except in a minority of cases, have shown no inclination to conserve the resources of their lands nor to make the necessary investments to return depleted lands to their former and natural state of productivity. When such situations cannot be met by other means, such as public cooperation and control, the interest of local communities and of the Nation as a whole requires that such lands be owned and managed by the public at public expense. The division of such public responsibility rests with the States and the Federal Government. A number of States have adopted adequate public forest programs; others have been slow in recognizing the problem or in assuming their share of the responsibility for its correction. Some States, while recognizing the problem, are not financially able to meet their fair share of the burden, and the Federal Government must assume the burden where State agencies are unable to do so. The Government's share of the total job logically includes lands of high national importance for watershed protection and timber growth. The lands in the 76 units under consideration definitely fall within this category.

Plan and Progress of Work: The acquisition of land under the Act of March 1, 1911, has been or is planned to be conducted in 76 purchase units located in 31 States and Puerto Rico. These units contain a gross area of 52,537,056 acres, of which 7,987,470 acres have been classified as nonpurchasable because of higher value for uses other than forestry, or because of prevaillingly acceptable use and management. The total area, which should ultimately be owned and managed by the United States, therefore, is 44,549,586 acres. As of June 30, 1940, the part thereof owned or in course of acquisition by the United States amounted to 20,726,800 acres. Of this area, 17,331,167 acres have been acquired by purchase, 3,045,750 acres by reservations from the public domain and by transfers from other agencies, and 349,903 acres through exchanges of national forest land and/or stumpage. Thus, there remains to be acquired approximately 23,822,786 acres, for which the estimated cost will be \$124,136,484 for the land, plus approximately \$20,000,000 to cover all costs incident to the purchase.

Revenues: Fees from the sale of timber, grazing, special uses, and other sources approximating \$1,338,400 were collected from the 76 national forests and purchase units under this project and deposited in the Treasury in the fiscal year 1940. Twenty-five percent of this sum will be returned to the counties in which the forests are located for maintenance of schools and roads and 10 percent will be used for national forest roads. The annual revenue has been progressively increasing and is expected to continue to increase as the lands bought years ago begin to produce returns from maturing timber and other resources which have been developed or renewed by proper protection and management.

(r) ACQUISITION OF LAND FROM NATIONAL FOREST RECEIPTS (RECEIPT LIMITATION)

Appropriation Act, 1941 \$71,000
 Budget Estimate, 1942 316,000
 Increase 245,000

PROJECT STATEMENT

Projects	: 1940	: 1941 :(esti- :mated)	: 1942 :(esti- :mated)	: Increase
Acquisition of lands in:	:	:	:	:
1. Uinta and Wasatch National Forests (Utah).....	\$40,000	\$40,000	\$40,000	---
2. Cache National Forest (Utah only)	5,999	6,000	10,000	+\$ 4,000 (1)
3. San Bernardino-Cleveland National Forest (Riverside County, California, only)	98	15,000	30,000	+ 15,000 (2)
4. Nevada-Toiyabe National Forest (Nevada)	9,603	10,000	10,000	---
5. Ozark-Ouachita National Forest (Arkansas only)	---	---	150,000	+150,000 (3)
6. Angeles National Forest (California)	---	---	35,000	+ 35,000 (4)
7. Cleveland National Forest (San Diego County, California)	---	---	6,000	+ 6,000 (5)
8. Sequoia National Forest (California)	---	---	35,000	+ 35,000 (6)
Unobligated balance	15,300	---	---	---
Total appropriation	71,000	71,000	316,000	245,000

INCREASES

The increase of \$245,000 in this item for 1942 consists of:

- (1) An increase of \$4,000 to accelerate the purchase of land for national forest purposes in the Cache National Forest, as authorized by the Act of Congress of May 11, 1938 (52 Stat. 347).

Objective: To minimize soil erosion and flood damage by acquiring privately-owned lands in the Cache National Forest.

Problem and Significance: The economy of Northern Utah is primarily one of agriculture, all lands suitable for tillage being rather intensively utilized for farm crop production. The agriculture of the region is

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[illegible]

almost wholly dependent upon artificial irrigation. In relation to the need, the water resources are relatively limited, making their careful conservation and use a matter of vital necessity to the dependent communities, the counties, and the State.

The President, by proclamation, recently has extended the boundaries of the Cache National Forest in Utah, embracing areas of vital importance to watershed protection. The lands thus added constitute widely isolated tracts under Federal management mingled with larger acreages in private ownership and upon which there has been no constructive control. The inclusion of the lands within the Cache National Forest will not accomplish the desired purposes nor permit the attainment of the objective of minimization of soil erosion and flood damage and the conservation of water unless some means is established by which the intermingled private lands progressively can be brought under public management, and it is for these reasons that the Government's acquisition program in this forest should be accelerated when the receipt from the forest, which Congress has authorized be used for this purpose, justify it. The estimated receipts for 1941 from the Utah part of the Cache National Forest will be approximately \$10,000, and an increase in the appropriation from \$6,000 to \$10,000 is recommended.

Plan and Progress of Work: The land acquisition program was inaugurated in the project in the fiscal year 1940. It is estimated that approximately 635,000 acres are in private ownership, the most critical areas of which should be acquired by the Government and protected and managed in conjunction with other Government lands to restore the land to its highest state of productivity for the public interests.

The residents of a large number of communities within or adjacent to the forests are intensely interested in having their watersheds adequately protected. There are indications that the people are willing to do their share in promoting this protection to the extent of buying certain key tracts and donating them to the Government, but the financial capacity of the communities and State agencies for rendering assistance in this manner is, of course, limited, and the Government will have to assume the major share of the responsibility for correcting the destructive conditions by purchasing a large share of the land for public administration. A small beginning in the purchase program was made in the fiscal year 1940 by the approval of purchase of 3,077 acres, costing \$7,784, part of which will be financed from the 1940 appropriation and part from the 1941 appropriation. If all the private lands within the Cache Forest are eventually purchased, the estimated cost to the Government will be approximately \$1,500,000; but some of the land is being managed under reasonably acceptable practices; others are not of strategic importance, and still others will probably be donated--so the final cost to the Government for completing the project may be considerably less than \$1,500,000.

(2) An increase of \$15,000 to purchase land for national forest purposes in the Riverside County parts of the San Bernardino-Cleveland National Forests, as authorized by the Act of Congress of May 11, 1938 (52 Stat. 347).

Objective: To minimize soil erosion and flood damage by acquiring privately-owned lands in the Riverside County (California) parts of the Cleveland and San Bernardino National Forests.

Problem and Significance: The lands within the San Bernardino National Forest and the Cleveland National Forest in Riverside County, California, comprise watersheds from which are derived the waters used to irrigate a large acreage of land, which is very intensively cultivated for the production of citrus fruits and other crops of immense value. Where adequate water is available, such land has a high per-acre production capacity. The City of Riverside and neighboring cities have large populations. Numerous water districts are also dependent upon this water.

The national forest lands bear a vital relationship to this culture in two important respects -- first, as an essential source of water supply; second, as a source of destructive influences in cases where protective cover is destroyed, giving free play to the forces of floods and erosion. The soils within the San Bernardino National Forest and the Cleveland National Forest in Riverside County are particularly subject to destructive erosion. The slopes are steep, and when the torrential rains come destructive floods are bound to originate on areas from which the vegetative cover has been removed. Many serious floods, causing immense loss of life and damage to property, have occurred on similar areas burned over and before the vegetative cover has been re-established.

Public control of all lands within the national forests in Riverside County, which are more valuable for national forest purposes than for other purposes, is imminently desired in order to eliminate existing hazardous and destructive conditions, to return lands to their maximum capacity for the production of natural wealth with attendant social and economic benefits to the public welfare, and to decrease the cost of administration of lands now in Government ownership.

Plans and Progress of Work: A program of acquisition was initiated in this project in the fiscal year 1940 by the optioning of four tracts of land totaling 4,110 acres offered at \$13,444. The act authorizing the Secretary of Agriculture to acquire lands in the project requires approval by the National Forest Reservation Commission of the purchases before payment for the lands can be made. The cases were presented to the Commission at its meeting on June 4, 1940, but approval of the purchases was withheld until additional information that the Commission wanted regarding the project and the immediate cases under consideration could be obtained. The Commission did not hold another meeting during the fiscal year, hence there was no opportunity to represent the cases and obtain Commission approval on them. The appropriation of \$15,000

for the fiscal year 1940, therefore, reverted to the Treasury.

There are 117,478 acres of private land within the project. Some is owned by water companies, which are giving adequate protection to their lands so that there will not be need for their acquisition. These, together with other lands that will probably not be acquired for various reasons, will materially reduce the final total acreage that will be acquired in the project; and, since the net area to be acquired cannot be definitely stated, the amount of Federal funds to be employed in attaining the objectives is indeterminate.

- (3) An increase of \$150,000 to purchase lands for national forest purposes in the Ozark and the Ouachita National Forests in Arkansas to make operative the Act of Congress approved March 5, 1940 (54 Stat. 46).

Objective: To minimize soil erosion and flood damage by acquiring privately-owned lands in the Ozark and Ouachita National Forests in Arkansas.

Problem: The problem is to vest in Federal ownership all the lands in the two national forests which are more suitable for forestry than for other purposes; to restore a forest cover where it has been depleted; to control soil erosion; to restore maximum capacity to absorb precipitation; thus reducing the rapid run-off of water, siltation of streams, and flood damage.

Significance: These two national forests form parts of the drainages of important tributaries of the Mississippi River which are reported to contribute more than their proportionate quota to the floods and sedimentation of the lower Mississippi. Unified management of all the lands on these drainages would increase the effectiveness and reduce the cost of watershed protection and best facilitate the development of the natural resources so important to the local economy. To that end, Federal acquisition of all lands within the two national forests in Arkansas, other than those more valuable for purposes other than forestry, is distinctly in the public interest.

Plan of Work: To examine, appraise, option, and acquire the most important tracts in the areas where, due to soil erosion, over-grazing, absence of proper fire protection, and general misuse of the lands, the surface soil is washing into the streams and tributaries of the Mississippi River and, through proper management, to correct the conditions which contribute to the general erosion and flood problem of the area. The Act of Congress, dated March 5, 1940 (54 Stat. 46), provides for the use of one-half of the receipts of the two national forests in Arkansas for the acquisition of lands to minimize soil erosion and flood damage. The estimated receipts for the fiscal year 1941 are \$340,000, of which an appropriation of \$150,000 is recommended for the fiscal year 1942. The average price paid for lands in these two forests in the past approximates \$2.60 per acre, and it is estimated that about 51,000 acres

will be acquired in the fiscal year 1942 with an appropriation of \$150,000.

- (4) An increase of \$35,000 to purchase lands for national forest purposes in the Angeles National Forest in California to make operative the Act of Congress approved June 11, 1940 (54 Stat. 299).

Objective: To facilitate control of soil erosion and flood damage by acquiring privately-owned lands in the Angeles National Forest in California.

Problem: The problem here is the reduction of hazardous conditions existing on privately-owned lands which endanger adjoining national forest lands and the general economy of the related orchards and farms dependent upon an adequate water supply for irrigation purposes. Purchase of the privately-owned lands and their proper protection and management by the Government is essential.

The Significance: The lands to be acquired are parts of watersheds situated within the Angeles National Forest, of which the waters are used to irrigate a large acreage for the production of citrus fruits and similar products. The value of these adjacent irrigated lands is governed materially by the water supply from lands within the Angeles National Forest. There are many highly developed communities within close proximity to this forest, and the forest bears a vital relationship to the surrounding lands and the inhabitants of the communities--first, as a source of water supply and, second, as a source of destructive influence where protective cover is destroyed, giving free play to the forces of flood and erosion. There are within the forest approximately 46,785 acres of privately-owned land. These lands make possible carelessness with fire, unwise clearing, destructive over-grazing, and disregard of closure orders during periods of high fire risk, all endangering adjoining and related national forest lands, beyond the control of the Government, and in conflict with the objectives of public service for which the national forest lands have been withdrawn. Federal acquisition of a number of the key areas will enable the Government to effectively manage the lands and reduce these hazards. Purchases will be made only as agreements, favorable to the Government, can be entered into.

Plan of Work: To examine, appraise, option, and acquire the key tracts, which, when consolidated with other national forest lands, will contribute the maximum benefits to the preservation or improvement of the very important water supply for irrigation and municipal use. The annual receipts of the Angeles National Forest have been averaging between \$28,000 and \$38,000 per year for the past five or six years. Congress has authorized an appropriation of the entire annual receipts from the forest, which for the fiscal year 1942 are estimated at \$35,000. With appropriations approximating that amount annually, the acquisition of the privately-owned lands on which acute conditions exist should be consummated in from six to ten years.

- (5) An increase of \$6,000 to purchase lands for national forest purposes in the Cleveland National Forest, San Diego County, California, to make operative the Act of Congress approved June 11, 1940 (54 Stat. 297-298).

Objective: To minimize soil erosion and flood damage by acquiring privately-owned lands in the San Diego County part of the Cleveland National Forest.

Problem: The problem is to acquire only such key tracts of land as can be bought at reasonable prices, which have important influence on the watershed of this forest. It is estimated that there should be purchased in the next few years some 5,272 acres which can probably be acquired at an estimated cost of \$51,000. In private ownership these lands tend to increase the difficulties and costs of administering intermingled national forest lands. Without proper Government protection and management, they will continue to contribute to the soil erosion and flood damage problem of the area and thus tend to defeat or offset the work that is being done on the Government lands.

Significance: The Cleveland National Forest was created primarily to maintain favorable conditions of stream flow. Throughout the area the preservation of the natural cover of the mountain slopes has long been recognized and proven to be the only effective way to check rapid run-off of water. Serious flood damage to the communities in the valleys watered by the streams from the national forests almost always follows destruction of the brush cover, and the only practical method of reducing these flood conditions is to restore or maintain the natural cover on the mountain slopes as an aid in absorbing the rainfall.

Plan of Work: The plan will be to make an examination of the tracts which, because of their misuse, are contributing to the detrimental conditions, and to negotiate for their purchase. If the prices at which they are offered are reasonable and within the Government appraised values, they will be optioned and acquired. With annual appropriations approximating \$6,000, the key and critical areas should be acquired within eight to ten years.

- (6) An increase of \$35,000 to purchase lands for national forest purposes in the Sequoia National Forest, California, to make operative the Act of Congress approved June 17, 1940 (54 Stat. 402).

Objective: To facilitate the control of soil erosion and flood damage by acquiring privately-owned lands in the Sequoia National Forest in California.

Problem and Significance: Within the exterior boundaries of the Sequoia National Forest, which has an area of 1,437,827 acres, there are scattered tracts not in Government ownership totaling 75,500 acres, varying in character from well-stocked virgin timberlands to seriously mismanaged range lands. Because of unwise cultivation and mismanagement, many of



the lands have so gullied as to render them almost valueless for private use and occupancy. These lands are so intermingled with national forest lands as to seriously interfere with the administration, utilization, and development of the adjoining lands of the United States on neighboring watersheds of local importance. Because of their key locations, they exercise a large measure of control and their acquisition by the Government is essential to the protection and management of adjacent lands and of the area as a whole.

Plan of Work: To examine, appraise, option, and acquire approximately 75,500 acres of privately-owned land; to consolidate these tracts with lands now in Government ownership and, by scientific management and protection from fire, restore them to their maximum capacity for production of natural wealth and thereby facilitate the control of soil erosion and flood damage. The average cost of the lands which it is most important to bring within public ownership should not exceed \$4 per acre. The estimated cost of acquiring the 75,500 acres is \$300,000 plus nominal costs incident to the purchase, such as examination, appraisal, title clearance, etc. Congress has authorized the appropriation of the entire receipts of the Sequoia National Forest other than from minerals for the acquisition of land. The average annual receipts for the past two years have been \$35,000, and an annual appropriation of that amount for the next ten years should permit completion of the proposed acquisition program.

CHANGE IN LANGUAGE

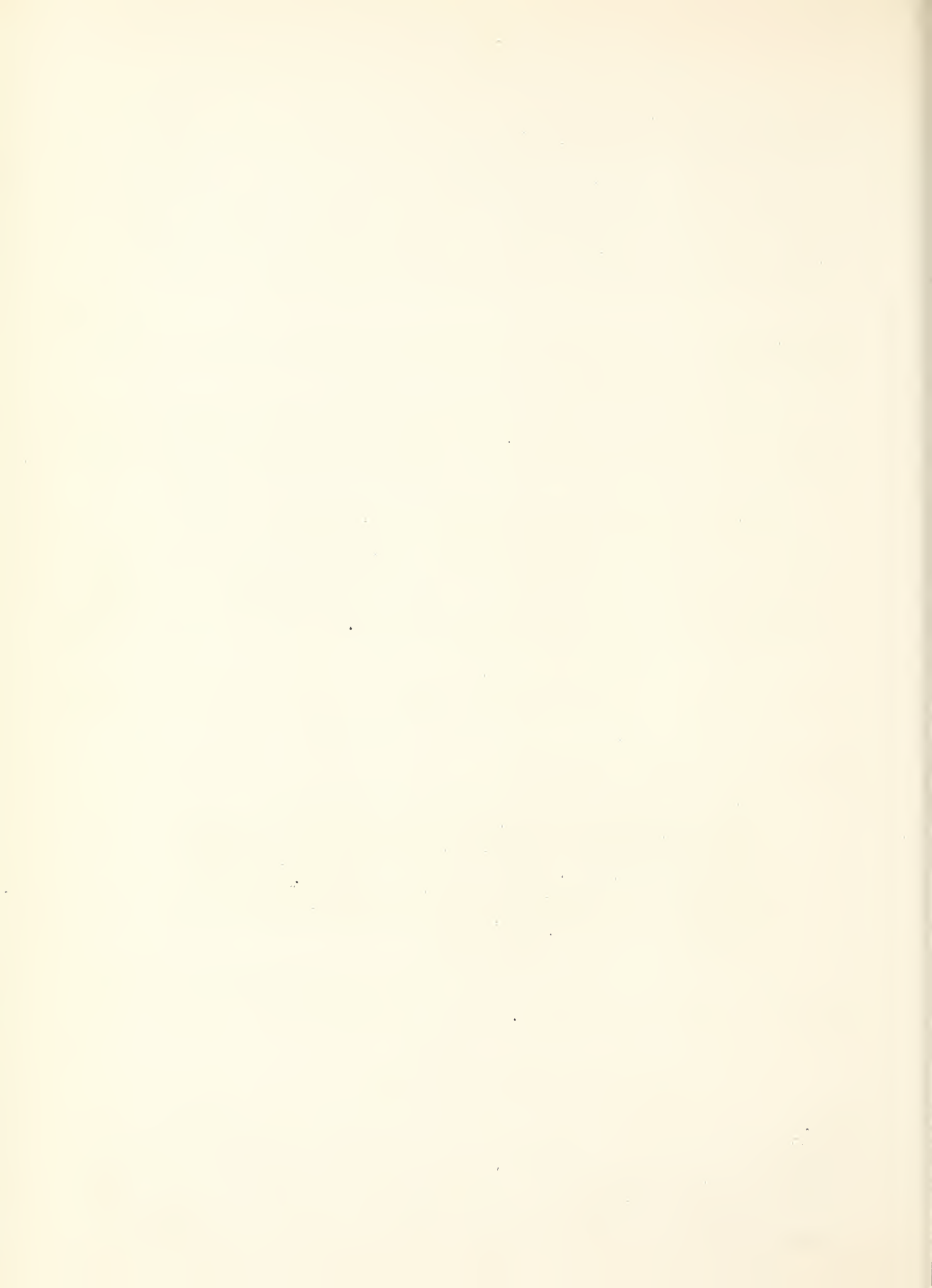
The estimates include four proposed additions to the language of this item reading as follows:

Ozark and Ouachita National Forests in Arkansas, Act of March 5, 1940 (54 Stat. 46), \$150,000; Angeles National Forest, California, Act of June 11, 1940 (54 Stat. 299), \$35,000; Cleveland National Forest in San Diego County, California, Act of June 11, 1940 (54 Stat. 297-298), \$6,000; Sequoia National Forest, California, Act of June 17, 1940 (54 Stat. 402), \$35,000;

These changes have been made to provide funds authorized for the acquisition of lands in accordance with legislation approved by Congress late in the fiscal year 1940.

WORK UNDER THIS APPROPRIATION

General: The work under this appropriation is concerned with the acquisition of land by the Government in eight different projects, i.e., the Uinta-Wasatch and Cache National Forests in Utah; the Riverside County parts of the San Bernardino and Cleveland National Forests in California; the Nevada and Toiyabe National Forests in Nevada; the Ozark and Ouachita National Forests in Arkansas; the Angeles and Sequoia National



Forests in California, and the San Diego County part of the Cleveland National Forest in California.

Under the Act of May 23, 1908 (35 Stat. 260), the receipts from national forest lands from timber sales, grazing, special uses, etc., normally are covered into the Treasury of the United States, and 25 percent of the receipts are returned at the close of each fiscal year to the States for use by the counties within the forests for school and road purposes. Congress has authorized the appropriation of a certain percentage of the total receipts from each of the aforementioned forests for the acquisition of land to facilitate the control of soil erosion and flood damage originating within the exterior boundaries of the forests covered by these projects.

To portray better the acquisition requirements, the progress that has been made, the ultimate cost of completing the work, and the anticipated time required to consummate the program, there follows statistical data on these subjects:

<u>LAND ACQUISITION PROGRAM UNDER NATIONAL FOREST</u>							
<u>RECEIPT FUNDS</u>							
	Estimated total acres that should be purchased	Estimated cost	Acres acquired or in course of acqui- sition	Cost	Remain- ing acres to be acquired	Estimated cost	*** Esti- mated time required to com- plete project (Years)
Project							

* Communities to buy and donate large areas to the United States.

** There are 117,478 acres of privately owned land within the Cleveland-San Bernardino Forests in Riverside County. Some of this land is owned by water companies which give it good protection, and some private holdings not of great public importance will not be acquired. The net area to be acquired by the Government cannot be definitely stated but is known to be only a minor proportion of the total private ownership included.

***In general, purchases within these national forests will be held within the limits of the special appropriations until larger regular appropriations are available to accelerate acquisition program.

The acreage listed in the foregoing table as "remaining to be acquired" is the known private land within the units. Some of these lands are being well managed and may not have to be acquired by the Government if their present policies of management continue; other lands are not so strategically located as to make their acquisition by the Government imperative. Additionally, there are indications that, because of the strong local interest in the communities within and adjacent to the Cache National Forest for bringing the lands in that project under Federal administration, the communities are willing to acquire as much of the private lands as they can afford to and donate them to the Government. For these reasons, the amount of land that the Government will have to buy in the future in each project to attain the objectives may be materially reduced, with an attendant reduction in the amount of Federal funds that will have to be used to consummate the acquisition program.

(s) PAYMENTS TO STATES AND TERRITORIES, NATIONAL FORESTS FUND

Appropriation, 1941 (revised)... \$1,432,581
 Budget Estimate, 1942 1,432,581

PROJECT STATEMENT

Projects	:	1940	:	1941 (estimated)	:	1942 (estimated)
Payments to States and Territo-	:		:		:	
ries from national forests fund	:	\$1,192,370	:	\$1,432,581	:	\$1,432,581
Unobligated balance	:	7,630	:	...	:	...
Total appropriation	:	1,200,000	:	1,432,581	:	1,432,581

WORK UNDER THIS APPROPRIATION

The law requires that 25 percent of all money received from the national forests during any fiscal year be paid to the States and Territories in which the forests are located. The amount of this appropriation varies each year in direct proportion to national forest receipts during the previous fiscal year. Increases in this appropriation are offset by additional revenue to the Federal Treasury.

1000

(t) PAYMENTS TO SCHOOL FUNDS, ARIZONA AND NEW MEXICO,
NATIONAL FORESTS FUND

Appropriation, 1941 (revised) \$23,392
Budget Estimate, 1942 23,392

PROJECT STATEMENT

Projects	1940	1941 (estimated)	1942 (estimated)
Payments to school funds, Arizona and New Mexico, national forests fund	\$23,555	\$23,392	\$23,392
Unobligated balance	6,445	...	...
Total appropriation	30,000	23,392	23,392

WORK UNDER THIS APPROPRIATION

Objective: To reimburse the States of Arizona and New Mexico such proportion of the gross proceeds from business on all the national forests within those States as the area of land granted to the States for school purposes within the national forests bears to the total area of all national forests within the two States.

Significance: Those payments are required by the Act of June 20, 1910 (36 Stat. 562 and 573) which provides "That the grants of Sections two, sixteen, thirty-two and thirty-six to said State, within national forests now existing or proclaimed, shall not vest the title to said section in said State but said granted sections shall be administered as a part of said forests, and at the close of each fiscal year there shall be paid to the Secretary of State, as income for its common-school fund, such proportion of the gross proceeds of all the national forests within said State as the area of lands hereby granted to said State for school purposes which are situated within said forest reserves may bear to total area of all the national forests within said State the amount necessary for such payments being appropriated and made available annually from any money in the Treasury not otherwise appropriated." School lands are given the same form of management accorded adjacent national forest lands.

Plan and Progress of Work: As soon after the close of the fiscal year as the amount of the receipts from national forests and the area of school lands in the States of Arizona and New Mexico are authoritatively determined, the payments referred to above are made to these two States. Payments in fiscal year 1940 were, \$23,077 to Arizona and \$478 to New Mexico.

(u) ROADS AND TRAILS FOR STATES, NATIONAL FORESTS FUND

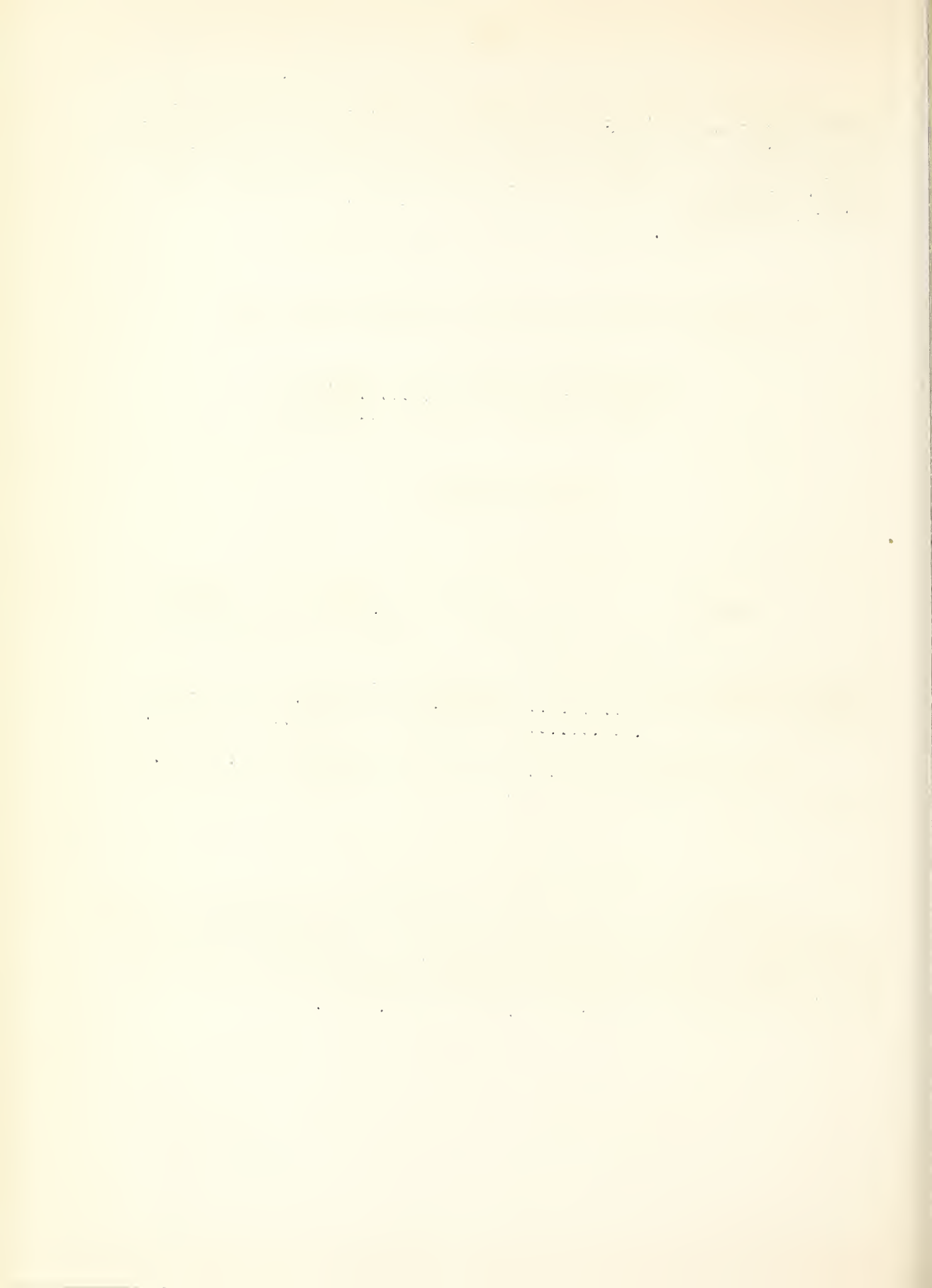
Appropriation, 1941 \$480,000
 Budget Estimate, 1942 480,000

PROJECT STATEMENT

Projects	:	1940	:	1941 (estimated)	:	1942 (estimated)
Roads and Trails for States, national forests fund	:	\$483,089	:	\$480,000	:	\$480,000
Unobligated balance	:	26,911	:	...	:	...
Total appropriation ...	:	510,000	:	480,000	:	480,000

WORK UNDER THIS APPROPRIATION

An additional 10 percent of all moneys received from the national forests during each fiscal year is available at the end thereof to be expended by the Secretary of Agriculture for the construction and maintenance of roads and trails within the national forests in the States from which such proceeds are derived. (16 U.S.C. 501).



(v) COOPERATIVE WORK, FOREST SERVICE
(Trust Account)

Appropriation Act, 1941 \$1,000,000
Budget Estimate, 1942 1,000,000

PROJECT STATEMENT

Projects	:	1940	:	1941	:	1942
	:		:	(estimated)	:	(estimated)
1. Construction of improvements...	:	\$138,593	:	\$128,000	:	\$128,000
2. Maintenance of improvements....	:	163,428	:	152,000	:	152,000
3. Prevention and suppression	:		:		:	
of forest fires	:	377,658	:	355,000	:	355,000
4. Disposal of brush and other	:		:		:	
debris in timber-sale opera-	:		:		:	
tions	:	198,068	:	185,000	:	185,000
5. Forest investigations	:	17,574	:	16,000	:	16,000
6. Administration	:	30,168	:	28,000	:	28,000
7. Reforestation	:	9,619	:	9,000	:	9,000
8. Refunds to cooperators	:	7,088	:	7,000	:	7,000
Total obligations	:	942,196	:	880,000	:	880,000
Transferred to Public Roads	:		:		:	
Administration	:	+118,945	:	+120,000	:	+120,000
	:		:		:	
	:	1,061,141	:	1,000,000	:	1,000,000

WORK UNDER THIS APPROPRIATION

Project 1. Construction of Improvements:

Objective: To facilitate the construction of improvements which are of mutual benefit to the Forest Service and to individuals, other public or private agencies, or organizations; to provide for the equitable division of the cost; and to simplify construction by concentrating the direction of the project under one agency.

The Problem: Many desirable proposed construction projects are of potential benefit to both the Forest Service and a second party. It is in the public interest to see that the other party or parties defray their fair share of the expense of such projects.

Significance: This authorization provides an efficient method of collecting a proportionate part of the cost of construction projects from other agencies, organizations, or individuals when intermingled interests dictate that their share of the benefit justifies their participation in the expense.

Plan and Progress: Construction of improvements such as roads, fences, water developments, and recreational areas are undertaken after the cooperator has entered into a written agreement with the Forest Service and deposited in the Treasury an amount sufficient to cover his share of the cost. The agreement specifies the character of the cooperation, the actual or approximate cost, how payments are to be made, and the disposition of unexpended balances, if any.

Project 2. Maintenance of Improvements:

Objective: To simplify the maintenance of improvements which are of mutual benefit to the Forest Service and to individuals, other public or private agencies, or organizations by sharing the expense in proportion to the benefits received but concentrating the work under a single agency.

The Problem: Some of the improvements on the national forests are so located and constructed as to be available for use by other parties without disrupting or curtailing their use by the Forest Service. In instances where this use is of special benefit to them, such as, for instance, the use of a Forest Service road, it is required that they defray their proportionate share of the maintenance expense.

Significance: This authorization provides an efficient method of collecting a proportionate part of the cost of such maintenance from other agencies, organizations, or individuals, when necessary.

Plan and Progress: Cooperative maintenance of improvements is covered by written agreement between the cooperator and the Forest Service. The agreement in each case states all the terms agreed upon by both parties and in most instances provides for payment on a unit cost basis such as per mile or per year.

Project 3. Prevention and Suppression of Forest Fires:

Objective: To obtain from owners of private land within national forest boundaries their fair share of the cost of protecting the units in which their holdings lie. Such private land lying within and immediately adjacent to national forest boundaries must, as a rule, be protected by the Government in self-defense, but private owners should nevertheless pay their way.

The Problem: National forests and purchase areas unavoidably include large acreages of privately owned land. In a few instances these tracts are large enough to permit management as separate protection units, and in an occasional instance the owner desires to maintain his own protective organization. In such instances no financial cooperation is expected provided the landowner handles his fires effectively enough to avoid any unreasonable danger to adjacent national forest land. Another classification of area includes small tracts belonging to resident owners. Such owners are seldom expected to cooperate financially. They normally render cooperation in ways more important than the small amount they would pay. Most non-resident owners are urged to contribute financially, the charge varying from a fraction of a cent an acre to more than 10 cents per acre, according to average fire danger and the difficulty of fire suppression. Large landowners, such as railroad companies, often prefer to cooperate on a flat rate basis except with respect to fire suppression which is handled on a pro rata basis for each season. This type of cooperative contract is favored by the Forest Service for large owners. Some associations, such as fruit growers, which own no land within national forest boundaries, cooperate financially because of their critical interest in national forest protection of water supplies upon which they are dependent. Counties and municipalities also cooperate frequently, but as a rule such political units make direct payments to men employed under national forest supervision from such funds.

Under the laws of some states, private landowners are assessed 3 to 5 cents per acre if they do not voluntarily cooperate, and for land lying within national forest boundaries such funds are made available to national forest protection.

The general problem is to work out an equitable distribution of the burden of protecting land lying within and immediately adjacent to national forests and lead private owners to pay their share.

Significance: Private owners who pay their way normally take a much greater interest in forest protection and render on that account much better support to efforts of all protection agencies to stimulate habits of fire safety and keep fires from starting. This prevention byproduct of financial cooperation is the reason for many campaigns by the Forest Service to obtain financial cooperation from owners of tracts so small that the money contributed hardly equals the cost of obtaining it.

Plan of Work: With many variations according to circumstances, private landowners are classified, and personal or written efforts are made to obtain regular financial cooperation.

Project 4. Disposal of Brush and Other Debris in Timber-Sale Operations:

Objective: To dispose of the logging slash and other debris on national forest timber sales in such a manner as to reduce the fire hazard and leave the areas in satisfactory condition for the production of future crops.

The Problem: In sales of national forest timber, the purchaser is required to conduct slash disposal where and when necessary in order to reduce the fire hazard and facilitate continued timber growth. Comprehensive experiments have developed ways and means of accomplishing this end, varying from no slash disposal in light cuttings in the humid Southeast to the piling and burning of all inflammable material resulting from the cutting in high fire-hazard areas on national forests in drier regions, such as much of the ponderosa pine type in the West. A great deal of difficulty was formerly experienced in obtaining satisfactory slash disposal on national forest sales, but in 1916 a law (U.S.C. Title 16, Sec. 490) was enacted which enabled the Forest Service to collect cooperative deposits from timber-sale purchasers for slash disposal. Under this authority the timber-sale purchaser deposits sufficient money to cover the cost of the work, which is then done by the Forest Service. This system has proved to be very satisfactory.

Significance: Regardless of how carefully the cutting is done on a timber sale, the timber reserved for future growth, together with established reproduction and seed trees from which the seed will come for future reproduction, may be destroyed by an accidental fire raging through the down tops, unmerchantable portions of the trees which have been felled, and other debris resulting from logging. In order to alleviate such conditions, it is necessary in many timber types to dispose of the slash, which is commonly piled in small compact piles, which are burned during periods of snow or rain when the fires may be readily controlled. In some cases the slash is lopped and scattered and the area is given additional intensive fire patrol for several years until the slash has decayed sufficiently so that it does not represent an extraordinarily high fire hazard.

Plan and Progress of Work: In areas of high fire hazard, timber-sale contracts usually require the operators to deposit funds to cover the cost of slash disposal. This is done in order to insure the prompt and proper disposal of debris resulting from timber-sale operations.

This is a continuing project, and the volume of work in any given year depends upon the volume and character of sales business. The necessity for and methods of slash disposal are the subject of continuing study in all forest regions and improved methods are constantly being developed and put into effect.

Project 5. Forest Investigations:

Objective: To facilitate joint research when of direct mutual benefit to the public and to individuals, public and private agencies, organizations or institutions; to provide for the equitable division of the cost; and to concentrate the work under a single agency in the interest of efficiency.

The Problem: Requests are frequently received from outside agencies and individuals for the inauguration of specific lines of research in which the applicants have a direct and immediate interest. The Cooperative Work fund provides a means of conducting such research projects at the applicant's expense. However, projects of this kind are not undertaken unless the results of the study are of public benefit also.

Significance: This authorization provides a method of collecting a part or all of the cost of investigations from individuals, agencies, or organizations where a potential special benefit accrues to them, thus justifying their participation in the expense.

Plan and Progress: Such special cooperative investigations are undertaken by the Forest Service, when clearly of potential public value, under the terms of a written agreement which specifies that the results are to be made public and which sets out the amount of the cooperator's payment to the Treasury.

Project 6. Administration:

Objective: To increase the efficiency and decrease the per unit cost of management of consolidated areas by including adjoining or intermingled private land in the forest and range management plans and operation of the national forests.

Problem: Interior and adjacent private holdings in the national forests are frequently susceptible to forest and range management in conjunction with the public lands. Their incorporation has the effect of simplifying national forest administration and of encouraging sound private practices.

Significance: This authorization provides a means whereby private lands that can be advantageously handled in connection with the administration of the national forests can be included in the over-all plan of management and for an efficient method of collecting a proportionate part of the cost from the concerned agency, organization, or individual.

Plan and Progress: Cooperative administration of lands is covered by a written agreement setting out the character and cost of the cooperative work (usually on a per-acre basis) and scheduling the necessary payments. Work is undertaken only after the cooperator has deposited the cost in the Treasury.

Project 7. Reforestation:

Objective: To reforest national forest cutover areas which are clear cut and where natural reproduction cannot be expected to occur satisfactorily.

The Problem: On relatively small areas of national forest timber sales, where all the trees are mature and overmature, the usual methods of selective logging, followed by natural reproduction, are impossible because of the character of the stand. Enormous quantities of slash result from such cuttings, and these can only be disposed of by broadcast burning. Such fires burn so fiercely as to destroy or seriously impair any seed trees which it may have been possible to leave. Under these conditions natural reproduction, if it results at all, will be delayed for a period of years, and may be inadequate for the site. In situations such as this, therefore, it is desirable to reforest the area artificially as soon as practicable after slash burning.

Significance: Since cutting of the type described in the preceding paragraph removes what would normally be the source of seed for reproduction of the cutover areas, were it possible to carry on that type of management, it is logical that the operator of the timber should make deposits in the "Cooperative Work" fund to cover the cost of artificial reforestation. This is authorized by the Act of June 9, 1939 (U.S.C. Title 16, Secs. 576, 576-a, and 576-b), which provides for cooperative deposits which may be used for reforestation of the area cut-over by the purchaser.

Plan and Progress of Work: When timber sales are made in stands which are handled in the manner above described, cooperative deposits for reforestation are obtained from the purchaser. After logging has finished, plans are made for planting, including the collection of seed and producing planting stock for the area. A comparatively small amount of planting is done under this authorization, chiefly in the national forests of the Pacific Northwest.

Project 8. Refunds to Cooperators:

General: This project contemplates the refund to cooperators of amounts due them as unexpended balance after the work of improvement construction or maintenance, prevention and suppression of forest fires, disposal of brush and other debris in timber-sale operations, forest investigations, administration and reforestation has been completed under the terms of their written agreements with the Forest Service.

SUPPLEMENTAL FUNDS

For Prairie States Forestry Project

Projects	Obligated, 1940	Estimated obligations, 1941
Emergency Relief, Agriculture, Forest Service (Transfer from W.P.A.): For expenses of the Prairie States Forestry Projects (North Dakota, Nebraska, Kansas, Oklahoma, South Dakota, and Texas):		
Administrative expenses	\$ 106,318	\$ 66,726
Project funds	2,092,323	1,150,000
Total	2,198,641	1,216,726

SUPPLEMENTAL FUNDS

Complete Bureau Statement
(1) Direct Allotments

Projects	Obligated, 1940	Estimated obligations, 1941	Estimated obligations, 1942
1. <u>Special Research Fund, Department of Agriculture</u> : For special research on bioclimatics and phenology	\$3,550	\$3,600	\$3,600
2. <u>Cooperative Farm Forestry, Department of Agriculture (Forest Service)</u> : Cooperation with States in the procurement, protection, and distribution of forest tree and shrub seeds and plants for farmers	143,384	123,000	123,000
Cooperation with States in carrying out farm forestry operations, including intensive projects and technical service to legally competent and adequate organizations of farmers, and in farm forestry investigations	30,984	36,901	36,901
Total	174,368	159,901	159,901

Projects	Obligated 1940	Estimated obligations, 1941	Estimated obligations, 1942
3. <u>Conservation and Use of Agricultural Land Resources:</u> For administration of naval-stores conservation program	\$37,640	\$34,540	\$34,540
4. <u>White Pine Blister Rust Control, Department of Agriculture (Forest Service).</u> For blister rust control on National Forests	693,000	644,000	694,000
5. <u>Flood Control, General (Transfer to Agriculture) (Forest Service):</u> Preliminary examinations and surveys, and works of improvement for headwaters control including up-stream engineering, soil stabilization and reforestation, on selected watersheds authorized by Flood Control Acts	785,926	1,844,197	1,412,316
6. <u>Golden Gate International Exposition (Transfer to Agriculture) (Forest Service):</u> For expenses in connection with exhibit at Golden Gate International Exposition	--	318	--
7. <u>Public Works Administration, Act of 1938 (Allotment to Agriculture, Forest Service):</u> For construction of dams, roads, buildings, fences, and other improvements on lands transferred to Forest Service under authority of Farm Tenant Act	19,916	9,007	--
8. <u>Loans, Grants, and Rural Rehabilitation:</u> For administration rural rehabilitation projects	4,192	4,250	4,250
9. <u>Emergency Relief, Agriculture, Administrative Expenses (Transfer from W.P.A.): (Forest Service):</u> Administrative expenses in connection with miscellaneous forestry projects	255,878	94,126	--

Projects	Obligated, 1940	Estimated Obligations, 1941	Estimated Obligations, 1942
10. <u>Emergency Relief, Agriculture, Forest Service (Transfer from W.P.A.):</u> For conservation of forest resources, surveys and mapping, and development of campgrounds as follows:			
(a) Mapping, boundary tracing, etc.	185,228	55,000	- -
(b) Miscellaneous improvements on national forests	2,504,555	740,640	- -
(c) Rodent, tree insect, and tree disease control	391,298	116,000	- -
(d) Range improvements	628,367	187,000	- -
(e) Planting and tree nurseries	2,338,580	1,322,000	- -
(f) Development of public camping grounds	223,522	67,000	- -
Total	(a) 6,271,550	(b) 2,487,640	- -
11. <u>Working Fund, Agriculture, Forest Service (Federal Power Commission):</u> Examination of power development located on national-forest lands.	1,231	1,200	1,200
12. <u>Working Fund, Agriculture, Forest Service (Transfer from Interior):</u> For reconstruction of Forest Service facilities within the Shasta Reservoir necessitated by construction of the Shasta Dam, California	164,700	125,000	103,340
Total, Supplemental Funds (Direct Allotments)	\$ 3,411,951	\$ 5,407,779	\$ 2,413,147

(a) For allocation by States, see table which follows.

(b) For allocation by States, see table which follows.

(a) Emergency Relief Funds (Item 10) obligated in 1940 as follows:

<u>States, etc.</u> <u>Project Funds</u>	<u>Obligations</u>	<u>States, etc.</u> <u>Project Funds</u>	<u>Obligations</u>
Alabama	\$93,966	Nevada	\$80,605
Arizona	139,417	New Hampshire	11,770
Arkansas	164,683	New Mexico	141,444
California	603,996	New York	275
Colorado	427,735	North Carolina	49,574
Connecticut	3,165	North Dakota	345,500
Florida	210,937	Ohio	13,861
Georgia	116,568	Oklahoma	313,000
Idaho	330,004	Oregon	278,953
Illinois	13,081	Pennsylvania	12,093
Indiana	15,308	South Carolina	18,883



(a) Emergency Relief Funds (Item 10) obligated in 1940 as follows: (cont.)

<u>States, etc.</u>		<u>States, etc.</u>	
<u>Project Funds</u>	<u>Obligations</u>	<u>Project Funds</u>	<u>Obligations</u>
Kansas	\$388,500	South Dakota	\$366,889
Kentucky	43,224	Tennessee	39,565
Louisiana	29,673	Texas	264,534
Maine	3,956	Utah	282,273
Maryland	15,701	Virginia	53,689
Massachusetts	3,882	Washington	185,702
Michigan	82,195	West Virginia	57,666
Minnesota	59,785	Wisconsin	93,163
Mississippi	52,339	Wyoming	54,621
Missouri	61,735	Alaska	22,749
Montana	210,448	Puerto Rico	2,472
Nebraska	413,900	District of Columbia	48,071
		Total	\$6,271,550

(b) Emergency Relief Funds (Item 10) allocated in 1941 as follows:

<u>States, etc.</u>		<u>States, etc.</u>	
<u>Project Funds</u>	<u>Allotments</u>	<u>Project Funds</u>	<u>Allotments</u>
Alabama	\$45,000	Nevada	\$24,100
Arizona	42,500	New Hampshire	2,400
Arkansas	32,000	New Mexico	63,900
California	191,940	North Carolina	19,200
Colorado	124,000	North Dakota	191,200
Connecticut	2,300	Ohio	3,000
Florida	29,200	Oklahoma	167,200
Georgia	70,200	Oregon	91,300
Idaho	166,500	Pennsylvania	4,000
Illinois	5,700	South Carolina	11,000
Indiana	5,700	South Dakota	205,300
Kansas	217,500	Tennessee	11,000
Kentucky	13,600	Texas	142,800
Maine	1,800	Utah	89,400
Maryland	4,700	Virginia	19,200
Massachusetts	1,900	Washington	45,200
Michigan	27,300	West Virginia	17,900
Minnesota	20,200	Wisconsin	23,200
Mississippi	17,800	Wyoming	34,200
Missouri	22,200	Alaska	7,200
Montana	18,400	Puerto Rico	1,500
Nebraska	226,000	District of Columbia	27,000
		Total	\$2,487,640

WORK UNDER EMERGENCY ALLOTMENTS

These allotments are used for such projects as the construction and maintenance of firebreaks, forest-fire lookout houses, towers and observatories, landing fields, telephone lines, forest roads and trails, housing for forest officers, miscellaneous buildings and structures,

WORK UNDER EMERGENCY ALLOTMENTS
(cont.)

planting, maintenance of tree nurseries, thinning of forest stands, fire prevention and control, fire-hazard reduction, construction and maintenance of improvement for recreational use of the forests, control of tree-destroying insects and diseases and of range-destroying rodents, eradication of poisonous range plants and revegetation of depleted ranges, construction and maintenance of range fences and other range improvements; surveys of forest resources such as timber, forage, water, wildlife, and related activities; surveys needed for forest activities, power-resource evaluation and appraisal, and development of the fish and game resources; studies relating to forest, range, and watershed management, protection, development, and utilization; and for other work and the purchase of equipment and supplies incident to or necessary in connection with any projects of the character indicated above.

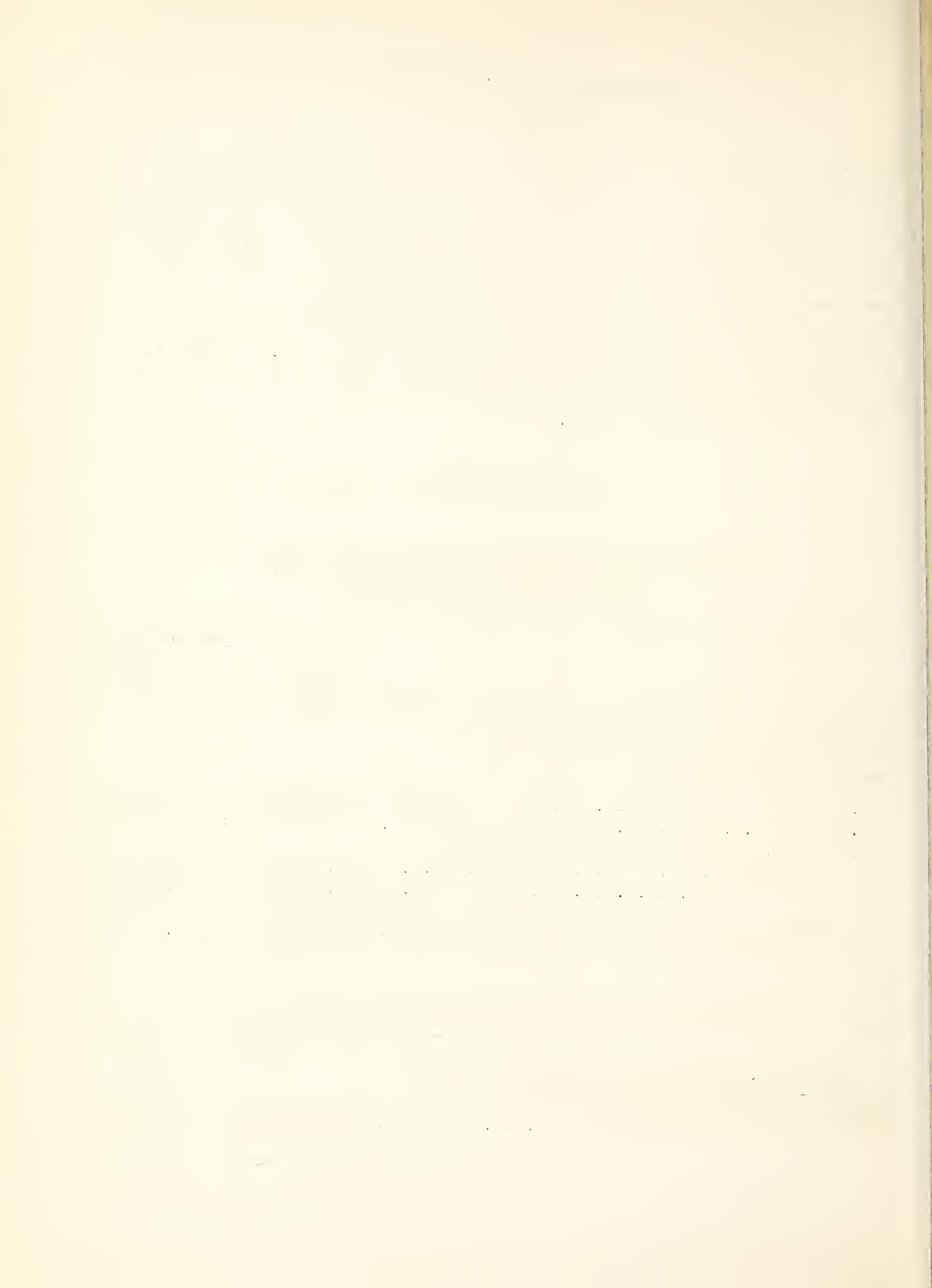
SUPPLEMENTAL FUNDS - continued

(2) Allotments under Civilian Conservation Funds
(financed by War Department)

Projects	:	:	Estimated
	:	Obligated,	obligations,
	:	1940	1941
Civilian Conservation Corps (Act of June 28, 1937, and supplemental acts; allotments through War Department):	:	:	:
1. National forests	:	\$14,417,946	\$12,174,175
2. Alaska	:	717,873	521,788
3. State, municipal, and privately owned lands	:	10,692,717	8,978,062
4. Puerto Rico	:	1,001,993	1,008,048
Total, Civilian Conservation Corps Funds:	:	\$26,830,529	\$22,682,073

Civilian Conservation Corps Activities (authorized by Act of June 28, 1937, and supplemental acts; allotment through War Department):

	1940	1941 (estimated)
1. <u>Civilian Conservation Corps Work on National Forests (includes a small number of miscellaneous camps)</u>	<u>\$14,417,946</u>	<u>\$12,174,175</u>



The number of camps on national forests on July 1, 1939, and July 1, 1940 (all camps on national forests unless otherwise indicated) were:

	<u>July 1, 1939</u>	<u>July 1, 1940</u>
Alabama	4	4
Tennessee Valley Authority	4	4
Arizona	11	11
Arkansas	11	13
California	36	36
Colorado	10	10
District of Columbia(Bureau of Plant Industry)	1	1
Florida	3	3
Georgia	5	5
Idaho	28	26
Illinois.	4	4
Indiana	2	2
Kentucky.	6	6
Louisiana	4	4
Michigan	23	23
Minnesota	15	15
Mississippi	8	7
Missouri	9	9
Montana	13	13
Bureau of Animal Industry	1	1
Nebraska	1	1
Nevada	2	2
New Hampshire	6	6
New Mexico	8	8
North Carolina	8	8
Tennessee Valley Authority	1	1
Ohio	2	2
Oklahoma	1	1
Oregon	17	17
Pennsylvania	3	3
South Carolina	5	5
South Dakota	7	7
Tennessee	4	4
Tennessee Valley Authority	11	11
Texas	6	6
Utah	8	8
Vermont	2	2
Virginia	10	10
Tennessee Valley Authority	2	2
Washington	15	16
West Virginia	5	5
Wisconsin	12	12
Wyoming	8	8
Cheyenne Horticultural Station (B.P.I.) .	1	1
Total camps	<u>343</u>	<u>343</u>

	<u>July 1, 1939</u>	<u>July 1, 1940</u>
Total, national-forest camps	322	322
Total, Tennessee Valley Authority camps . . .	18	18
Total, Bureau Plant Industry camps	2	2
Total, Bureau Animal Industry camps	<u>1</u>	<u>1</u>
Total	343	343

WORK UNDER FOREGOING ALLOTMENT

This allotment is used for the pay of supervisory and facilitating personnel necessary for the field work done from C.C.C. camps mainly on the national forests; also for the purchase of necessary equipment and construction materials and for miscellaneous expenses incident to the field work of the camps. The field work on the national forests includes the construction of physical improvements needed for the protection and administration of the forests, tree planting, thinning of young stands of timber, destruction of undesirable timber species, rodent control, etc.

	<u>1940</u>	<u>1941</u> (estimated)
2. <u>Civilian Conservation Corps Work</u> <u>in Alaska</u>	<u>\$717,873</u>	<u>\$521,788</u>

WORK UNDER FOREGOING ALLOTMENT

This allotment (Alaska) is used for pay and allowances to dependents of enrolled members of the Civilian Conservation Corps and for salaries and wages of extra supervisory and clerical personnel needed in connection with the work. It is also used for the purchase of clothing, subsistence, supplies, and camp equipment required for enrolled men of the Corps and for the purchase of construction materials used in the work. Classes of work done under this allotment include construction of trails, minor roads, bridges, water development and improvement, and miscellaneous administrative improvements; roadside clearings and public campground improvement; estimating timber resources; and other miscellaneous work. The men engaged in the work are recruited from the unemployed local residents, including Indians, without regard to age.

	<u>1940</u>	<u>1941</u> (estimated)
3. <u>Civilian Conservation Corps Work on State,</u> <u>Municipal, and Privately Owned Forest Land</u>	<u>\$10,692,717</u>	<u>\$8,978,062</u>

Number of camps by States on July 1, 1939 and July 1, 1940:	<u>July 1, 1939</u>	<u>July 1, 1940</u>
Alabama	3	6
Arkansas	6	4
California	7	7
Connecticut	10	10
Florida	5	6
Georgia	6	6



	<u>July 1, 1939</u>	<u>July 1, 1940</u>
Idaho	4	5
Illinois	1	1
Indiana	5	5
Iowa	3	3
Kentucky	6	6
Louisiana	5	5
Maine	5	5
Maryland	7	6
Massachusetts	12	12
Michigan	12	12
Minnesota	11	10
Mississippi	4	4
Missouri	3	3
Montana	1	1
New Hampshire	5	5
New Jersey	10	10
New York	32	32
North Carolina	5	5
Ohio	5	5
Oklahoma	2	2
Oregon	9	9
Pennsylvania	33	33
Rhode Island	2	2
South Carolina	8	7
Tennessee	4	4
Texas	6	4
Vermont	6	6
Virginia	10	10
Washington	7	7
West Virginia	7	7
Wisconsin	<u>12</u>	<u>12</u>
Total camps on State lands, etc. .	279	277

WORK UNDER FOREGOING ALLOTMENT

This allotment is used for the payment of expenses incurred in the conduct of Civilian Conservation Corps work on State, municipal, and privately owned lands; including the purchase of supplies, materials, and equipment used in the work, for payment of salaries and wages of supervisory personnel directing the work of the enrolled men, and for other necessary expenses incident to the work.

The work being accomplished under this allotment includes the protection of State and private forest land from fire by construction of firebreaks, lookout towers, communication systems, truck trails, tool sheds, guard houses, and the fighting of forest fires; protection of State and privately owned forests from the epidemic spread of forest insects and tree diseases; forest cultural measures to improve the forest growth on State-owned lands; and the construction of simple dams and the planting of trees, grass, etc., for the control of erosion and flash runoff at the headwaters of streams.

	<u>1940</u>	<u>1941</u> (estimated)
4. <u>Civilian Conservation Corps Work in</u>		
<u>Puerto Rico</u>	<u>\$1,001,993</u>	<u>\$1,008,048</u>

WORK UNDER FOREGOING ALLOTMENT

This allotment (Puerto Rico) is used for the payment of authorized enrollees and the supervisory personnel engaged in the technical direction of the work projects on the Luquillo National Forest and the insular forests and for the purchase of equipment and supplies incident to the work.

The work projects comprise the construction and maintenance of roads and trails, production of nursery stock, making new forest plantations and thinning old ones, forest thinnings to improve the timber stands within the national and insular forests, and development of a recreational area within the national forest. With a population of 1,500,000, the unemployment situation in Puerto Rico has been acute and, since the enrollment of 2,317 men has been on a pro rata basis from the 72 insular municipalities, the C.C.C. work has played its part in giving a measure of relief. Camps are not established as they are in the States, since a large proportion of the enrollees live at home and go to and from the work projects.

PASSENGER-CARRYING VEHICLES

The authorization for the purchase of passenger-carrying vehicles for the Forest Service from appropriations other than Forest Roads and Trails contemplates a decrease of \$5,223 (\$61,628 in 1941, \$56,405 estimate for 1942). This \$56,405 will permit the needed replacement of ninety vehicles at a net average cost of \$628 when exchange allowances are taken into account.

From the appropriation Forest Roads and Trails for the fiscal year 1941 an increase of \$477 (\$9,755 in 1941, \$10,232 estimate for 1942) for passenger-carrying vehicles is recommended. All the sixteen vehicles which it is proposed to purchase from this authorization are needed for replacement of vehicles now in use, at a net average cost of \$640 when exchange allowances are taken into account.

It is estimated that the average mileage of the cars to be replaced, as of June 30, 1941, will be in the neighborhood of 55,000 miles.

FOREST ROADS AND TRAILS

(Carried under "General Public Works" in 1942 Estimates)

Appropriation Act, 1941.....	\$9,000,000
Allotment 1941, to be transferred in 1942	
estimates to Bureau of Agricultural	
Economics.....	<u>44,500</u>
Total available, 1941.....	8,955,500
Budget estimate, 1942.....	<u>9,955,500</u>
Increase.....	<u><u>1,000,000</u></u>

PROJECT STATEMENT

Projects	:	1940	:	1941 (estimated)	:	1942 (estimated)	:	Increase
1. Forest highways.....	:	\$7,256,000	:	\$6,258,000	:	\$6,973,000	:	\$715,000 (1)
2. Forest road development.	:	2,730,000	:	2,697,500	:	2,982,500	:	+285,000 (2)
Total.....	:	9,986,000	:	8,955,500	:	9,955,500	:	+1,000,000

INCREASE

The increase of \$1,000,000 in this item for 1942 consists of:

(1) An increase of \$715,000 for "Forest Highways."

- (a) To permit utilizing a major part of the appropriation authorization for the fiscal year 1941, in the construction of Forest Highways urgently needed by the States, counties or communities.
- (b) To assist in the construction or improvement of Forest Highways forming a part of the National Defense road system and urgently needed for National Defense.

From the recommended appropriation of \$6,973,000, \$1,000,000 will be required as in the preceding years (1) for the maintenance of Forest Highways as required by cooperative agreements; this normally is for the two-year period following the completion of the construction contract, subsequent maintenance being financed by the State or County; (2) for making surveys, plans and estimates so as to be prepared for prompt construction of future projects; in this connection and due to emergency conditions, obviously much consideration will be given to National Defense needs; (3) for the administration of the activity by the Forest Service and the Public Roads Administration.

Ordinarily, the above is financed from the appropriation made from the authorization of the same year as the appropriation. However, since the recommended appropriation legislation provides for no appropriation from the fiscal year 1942 authorization, maintenance, surveys and administration must be financed twice from the fiscal year 1941 authorization and the amount of such authorization available for construction obligation is \$6,666,667, of which \$5,973,000 is recommended for appropriation in the 1942 Budget.

The purpose of the recommended increase of \$715,000 and of the appropriation of \$6,973,000 is to permit carrying out the construction program approved about a year ago, revised as seems advisable to assist in National Defense operations. The appropriation recommended will be \$693,667 less than that required for complete discharge of the obligations, but is expected to be adequate to discharge such obligations as will fall due within the fiscal year 1942.

The fiscal year 1942 authorization of \$7,000,000 for forest highways will be apportioned and programs approved in order that construction may be started promptly after funds are made available.

- (2) An increase of \$285,000 for "Forest Road Developments," which is needed to the extent that available funds will permit, in order to maintain 88,134 miles of truck trails and 139,758 miles of horse trails, thereby providing for maximum usefulness of these improvements in the protection and management of the National Forests, and for the protection of the investment in existing truck and horse trails.

All of the maintenance work planned for the fiscal year 1942 is for roads and trails on the Development System which thorough study and analysis and scientific and systematic planning have demonstrated is essential to the protection, development, utilization and administration of the forest land and resources.

Maintenance is necessary because of wear due to actual use and because of damage or losses by rain, snow, wind and freezing or thawing.

The gross National Forest area is approximately 10 percent of the entire area of the continental United States. The area is generally rough, rugged, mountainous and remote. The forests contain 565 billion board feet of commercial saw timber besides many other timber, land and water resources. Some 80,000,000 acres of the National Forests are utilized for grazing of over five and one-half million sheep and goats and 1,400,000 cattle and horses each year. Developed and undeveloped water power amounts to 11 million horsepower. Many communities are dependent on the mineral resources in the forests. Recreation values are enormous, there having been over 32 million National Forest visitors in the year 1939, of which number 14 million were hunters and fishermen and those who utilized picnic areas, summer homes, and other recreation areas. Nearly four million people live in or near the National Forests.

The objectives of maintenance are (1) that the transportation facility may give the planned service whenever needed; (2) that money invested in construction or improvement - for truck trails, this is roughly 100 times the annual maintenance cost - is not lost.

For truck trails, rather generally and usually, the second objective above stated requires thorough maintenance in the late fall. In the spring, maintenance for both objectives is necessary. On the more heavily used truck trails, the first objective requires in-between operations of blading or dragging the road surface. Under very favorable natural conditions and where travel is very small, maintenance every second or third year is satisfactory and is practiced.

The general policy is to do such maintenance as is necessary but no more. Also to reduce the cost per mile to the minimum practicable with satisfactory results.

For horse trails, ordinarily one maintenance operation annually is adequate; under especially favorable conditions, maintenance every second or even every third year is satisfactory.

Work to be Done

No construction or betterment work is planned during the fiscal year from the recommended appropriation of \$2,982,500. Expenditures will be made solely for maintenance of truck and horse trails.

During the fiscal year 1942, maintenance to the extent needed and justified must be provided for the 87,337 miles of truck trail and 139,424 miles of horse trail in existence on June 30, 1940 plus the additional mileage constructed during the fiscal year 1941 primarily by CCC. This addition is estimated as 797 miles of truck trail and 334 miles of horse trail. The total existing system on June 30, 1941 will therefore be about 88,134 miles of truck trail and 139,758 miles of horse trail.

In the fiscal year 1940, 67,419 miles of truck trail and 118,097 miles of horse trail were maintained. Approximately 16,500 miles of truck trail and 18,900 miles of horse trail in the existing system on June 30, 1939 were not maintained either because the standard was so unsatisfactory as not to justify maintenance expenditure or because the projects were maintained at longer than one year interval.

Assuming non-maintenance in the fiscal year 1942 of the same amount as in the fiscal year 1940, about 71,600 miles of truck trail and 120,900 miles of horse trail will require maintenance.

In past years considerable aid has been given to maintenance by CCC, and WPA. However, the amount of yearly aid has been rapidly decreasing. It is evident that the amount in the fiscal year 1942 will be much less than the preceding year and very much less than in the fiscal year 1940. The financial plan is based on 20% of the truck trail mileage being maintained by CCC and WPA, particularly the first named.

This maintenance work is located in 160 National Forests and Purchase Units and in 40 States, Alaska and Puerto Rico. The total expenditure for maintenance and administration amounts to about 1.4 cents per acre of land in the National Forests and Purchase Units.

CHANGES IN LANGUAGE

The estimates include proposed changes in the language of

this item as follows (new language underscored, deleted matter enclosed with brackets):

For carrying out the provisions of section 23 of the Federal Highway Act approved November 9, 1921 (23 U.S.C. 23), including not to exceed \$59,500 for departmental personal services in the District of Columbia, [~~\$9,000,000~~] \$9,955,500, which sum consists of part of the balance of the amount authorized to be appropriated for the fiscal year 1940 and \$2,000,000 of the amount authorized to be appropriated for the fiscal year 1941 by the Act approved June 8, 1938 (52 Stat. 635), to be immediately available and to remain available until expended: Provided, That this appropriation shall be available for the rental, purchase, or construction of buildings necessary for the storage and repair of equipment and supplies used for road and trail construction and maintenance, but the total cost of any such building purchased or constructed under this authorization shall not exceed \$7,500: Provided further, That there shall be available from this appropriation not to exceed \$5,000 for the purchase of land and \$45,000 for the construction of a building at Missoula, Montana, for the storage and repair of Government equipment for use in the construction and maintenance of roads.

The words "and repair" have been included in the existing proviso to forestall possible questions as to the authority of the Forest Service to repair equipment stored in Government owned equipment depots. Road equipment is being repaired at the present time in equipment depots and it is recommended that the language of the item be changed to recognize this fact.

A new proviso has been added for the purchase of land and the construction of a building at Missoula, Montana, for the storage and repair of road equipment. At the present time a temporary warehouse building, which is in a bad state of repair and located on leased land, is being utilized for this purpose. The new building would be located adjacent to the Department of Agriculture consolidated repair shops. It would be used for the storage of road building equipment and supplies used on forest highway work in Montana by the Public Roads Administration. It would also provide for servicing of automobiles and light trucks.

All other changes in this item are made to show the status of the authorization upon which the forest road and trail appropriation for 1942 is based.

WORK UNDER THIS APPROPRIATION

Project 1: Forest Highways

General: As explained in the similar statement for Forest Development Roads and Trails, the Forest Highway System and the Forest Development System constitute the Forest Road and Trail System --

the planned transportation system for the National Forests.

Both Forest Highways and Forest Development Roads must serve the forest land and resources. The only difference is in the relative value of the service to the forests and to "the State, counties or communities, within, adjoining or adjacent to the National Forests". A road is designated a Forest Highway and becomes a part of the Forest Highway System when the value for the second purpose is the higher. However, since relative importance rather than total is the measuring stick, some individual Forest Highways are of greater total value to the Forests themselves than certain other Development Roads. Accordingly the completion of the Forest Highway system is essential to securing the transportation system needed for the administration, protection, development and utilization of the National Forests. But rather frequently the road standard necessary for the Forest use is lower than that deemed required to properly serve the public travel.

The law creating the Forest Highway Fund does not permit its expenditure upon foot and horse trails.

Forest Highways are a part of the public transportation system of the Nation as against Development Roads which, while open to public travel, are essentially "property roads". Of the 24,077 miles which in the judgment of the Forest Service should be designated Forest Highways, 40 percent are on the Federal Aid or primary trunk system, 38 percent on the State Highway or secondary trunk system and 22 percent on the County and Community Road System, that is laterals to the Federal Aid and State systems and feeders to the more remote and less heavily populated sections.

The volume of traffic is usually the greatest on the Forest Highways on the Federal Aid System. However per dollar expended for road purposes, a County or a Community road while relatively highly traveled may bring a higher value per vehicle and in aiding and promoting the development and utilization of local agricultural, forest or mineral resources.

Objective: A Forest Highway System adequately serving National Forest activities and resources and satisfying the requirements of public travel within or across the Forests.

The Problem and Its Significance: The problem is to construct or improve the Forest Highways so that they will give service when and in the amount required and so that all forest sections of highways entering or crossing the forests will be as satisfactory for travel as the highways outside the forests.

Particularly following the passage of the Federal Aid Road Act in 1916, billions of dollars have been expended by the

Federal Government, the States and the Counties in the construction and maintenance of public roads. Per mile of road existing or planned as necessary, the available funds for the roads outside the Forest boundaries have greatly exceeded the specific appropriations for Forest Highways. The situation in various States varies greatly but in most of the eleven Western States, the State Highway Commissions have been opposed or reluctant to approve the construction of Forest Highways from the State or Federal Aid appropriations. Counties have been utilizing their more limited funds on the most important roads from the County standpoint and frequently such roads are located outside of the forest boundaries or do not extend far back into the forests.

Travel into or across the forests is far from restricted to that in connection with forest administration or the resources. In addition there is a large volume of other or public travel. According to the 1938 traffic counts, this public travel amounted to 82 million people. This was additional to the 32 million who traveled over forest roads for recreation of some form. Of course the 82 million included many who made more than one trip. Nevertheless a very substantial portion of the national population found it necessary or desirable to travel into or across the forests. Except with Forest Highways, this would not have been possible.

A relatively large proportion consists of local travel, that is people living within or near the forest boundaries. Much of the more local travel is intercity and intercommunity. Upon it depends the social and economic welfare of many people living in or near the forests. Approximately 19 percent of the total area within the forest boundaries is privately owned. These alienated lands and other lands outside of but adjacent to the forest boundaries are used for growing timber and cordwood, stock grazing, mining, resort sites, small business establishments and in many other ways. Whether the people so engaged live in or outside the boundaries, travel on forest roads is necessary to conduct their business, to get their mail, to transport children to school, to make business or social trips, to obtain supplies and to carry the products of the land to the railroad or town and city markets. These road users expect that the roads in the forests will fully meet their needs.

The National Forests and Purchase Units are located in practically all sections of the United States. In all the far Western States they include a large portion of the total State areas. All the main roads for east-west travel and very largely those for north-south travel must cross the forests, for considerable distances and at times very many miles. Unless the Forest Highways are of suitable standard, such travel is impeded and at times is practically prevented. Furthermore the usefulness and value of the entire route is lessened.



In the eastern part of the United States, the highway system is much more intensive than in the West. Many sections of the roads which the interstate or intrastate traveler wishes to use are located in the National Forests. However, usually the distances are shorter, the width of forest narrower. At the sacrifice of time and expense, it is frequently possible to avoid using the Forest Highways. The improvement of the Forest Highways will bring a higher return from the expenditure of public money.

Some Forest Highways, particularly those on the Federal Aid System, are as good and occasionally are even of higher standard than the adjoining sections outside the forest boundaries. Generally however this is not true and adequate service to the traveling public will not be given until a very large program of construction has been completed. The travelers contend that they are entitled to good Forest Highways and insist that it is a responsibility of the Federal Government that fully satisfactory roads be provided.

Because of the size of the public demand, a very large part of the Forest Highway expenditures in the past has been on the roads of greatest volume of travel. These roads largely are on the Federal Aid System but include some of the more important State highways. The job of constructing these trunk roads is far from complete. But in addition much work is required on the County and Community roads and on the State Highways of lesser importance from the traffic-volume standpoint. These roads are comparable to the farm-to-market class but for the forests, forest-to-market is a better term. It does not help the owner of timber, the miner or other developer or user of private land or resources to know that within a few miles there exists a highway more than ample for his requirements if he has no opportunity to get to that highway. Many miles of existing roads can be made satisfactory through betterment work. Many more must be entirely relocated or reconstructed. Still others are necessary to open up areas now entirely unserved by roads or to permit developing resources now needed and where the expenditure for transportation facilities is fully justified.

That other than the Federal appropriation for Forest Highways should finance maintenance of Forest Highways is almost universally accepted as right and proper. However since maintenance during the two-year period following the completion of construction is essentially the completion of construction, the maintenance of projects constructed in whole or in part from the Forest Highway Fund is ordinarily financed from that fund during that period. The total annual expenditure of course is governed by the size of the construction operation during the two preceding years. During the past few years, the average cost per mile was \$547 and the average annual expenditure from the Forest Highway Fund approximated \$500,000.

Plan and Progress of Work: The construction and maintenance of Forest Highways has been a "going operation" for many years.

The appropriation is set up to the Secretary of Agriculture. Regulations approved by him prescribe the general procedure and when and by whom, approval to specific action will be given.

Handling the fund, under the Secretary of Agriculture's direction, is a cooperative undertaking of the Forest Service and the Public Roads Administration. Both, after receiving the advice of the State Highway Commission, participate in recommending which projects should be given the Forest Highway designation and which projects, the character and amount of work and the expenditures, should be approved as the annual program.

The Forest Service supervises the survey, construction and maintenance of "minor projects". By the regulations, a minor project is one whose survey and construction does not require the technical services of a highway engineering organization and whose estimated average cost is less than \$2000 per mile. The Public Roads Administration, utilizing money set up to its credit by the Forest Service, supervises or accomplishes all other survey, plans, estimates, construction and maintenance. Nearly all construction work is handled by contract. At times the services of the State Highway Departments are utilized. The Regulations require certain inspections and approvals by the Forest Service which also prepares the final reports and makes the presentations to the Bureau of the Budget and to Congress.

Careful determination of the needs is essential and the transportation plans prepared by the Forest Service (see "Forest Development Roads and Trails, Work Under This Appropriation, Plan of Work") include the needs for Forest Highways, since a part of the Forest Road and Trail System. The results of this plan aid in deciding which projects legally qualify as Forest Highways and in determining which projects are most urgently needed and should be first approved for expenditure.

As of June 30, 1940, the mileage and status of the Forest Highway System planned by the Forest Service was as follows:

	<u>Miles</u>	<u>Percent</u>
Satisfactory Standard	12,141	51
Unsatisfactory Standard	10,676	44
Nonexisting	<u>1,260</u>	<u>5</u>
Total	24,077	100

Given a reasonable period for employing and training engineers and other technical and clerical personnel and provided the number of competent and qualified contractors is ample to assure good competition and reasonable prices, the size of the present Forest Highway construction program can be increased several times without loss of efficiency.

Project 2: Forest Development Roads and Trails

General: The Forest Development Road and Trail System supplements the Forest Highway System. Together they form the National Forest Road and Trail System i.e., the transportation system necessary for adequate service to the National Forests. Usually a Development road is a feeder to a Forest Highway but occasionally it connects directly with the "non-Forest" highway system outside the Forest boundaries. Usually the terminus of a Development foot or horse trail is a Development road, occasionally a Forest Highway and infrequently a point of the non-Forest system.

The Development System from the Forest land and resource standpoint, is the most valuable part of the Forest road and trail system. However, unless the other part - the Forest Highway System - is also provided to the standard requisite to Forest land and resources, the service rendered by a completed Development System will be inadequate. The two systems are inseparable since the real objective is the combination of the two - the Forest Road and Trail System.

The Development "roads" with few exceptions differ greatly from what are ordinarily called roads - that is, highways - in standard of alignment, width, gradient and surface, in cost per mile, in travel speed, and in methods and equipment used in construction. Because of this and to prevent confusion, the term "truck trail" is used to describe the Development road. "Trail" means a foot or horse trail.

The basic Forest road and trail law requires a distinction between roads essential to and rendering service to the National Forests. The Forest Development designation is given if, for an individual road, the value of the service rendered is greater for administration, protection, development or utilization of Forest land or resources than it is for public travel or service to the people living near the Forests. If the reverse be true, the road is called a Forest Highway.

Development truck trails are of value to practically every Forest activity or use. They are extensively used by the public for all sorts of purposes. Public use is prohibited only in exceptional cases of individual truck trails or for short periods of time and because of danger of setting Forest fires.

Trails are an essential part of the fire detection and suppression system. Some are also extensively used for forest administration, mining development and recreation and occasionally for other purposes.

Objective: A transportation system of Development truck trails and trails which at the lowest annual expenditure for maintenance and interest on construction investment will fully meet for all forest activities and resources, the needs now existing or within the following 10 years. The annual cost shall be less than the value of annual service rendered.

Further objectives for the Development System are (1) the construction of truck trails and trails into areas now unserved provided that thorough study, investigation and analysis of needs, benefits, costs and returns show that these are essential and are justified by service to Forest land or resources; (2) the betterment, relocation or reconstruction of such essential existing truck trails and trails as are now rendering inadequate service or where the maintenance cost is excessive or unreasonable; (3) continuous maintenance of all necessary truck trails and trails at the least annual expense possible for giving adequate transportation service and for protecting the investment.

The Problem: Transportation facilities adequate for the pioneer days became inadequate when the land and resources were more intensively used; roads and trails on a more favorable location, less grade, greater width and smoother surface were called for. This process of evolution, change and development has continued. There has always existed a need for better transportation facilities than could be financed from available funds. The result was inadequate service to the protection development and utilization of the resources. Better and larger utilization and lower costs to the public would have been secured if the transportation development had proceeded faster, provided that at all times the returns from a road or trail during its effective life exceeded the cost of construction or improving and of maintaining.

The same situation of inadequacy now exists. 56 percent of the planned truck trail mileage and 29 percent of the trail mileage is of unsatisfactory standard. The problem is how to get this mileage into condition so that required service to the Forests may be rendered. The work involved includes the betterment or improvement of 35,195 miles of truck trail and 27,925 miles of trail; the construction of 30,970 miles of truck trail and 18,077 miles of trail into areas where there are now no transportation facilities.

The job is dependent on Federal financing. It is generally agreed in Congress and elsewhere, that because the larger value, greatest use and highest importance of the Forest Development system is for Forest protection, administration and utilization, little co-operation on the construction or maintenance of the system can be expected or should be required. These are property roads and trails. Constructing them is an obligation of the property owner - the Federal Government. Contributions from the various taxes on road users are seldom justified.

For work financed from the regular road and trail funds, the average cost per mile of constructing and bettering truck trails and trails for the fiscal year 1939 was as follows:

F. Y. 1939

Construction	
Truck Trails	\$2661
Trails	216
Betterment	
Truck Trails	1266
Trails	162

The problem, however, involves more than construction and betterment work.

Each constructed or improved truck trail and trail must be continuously and adequately maintained to protect the investment and to assure the planned service being rendered at all times when needed. During the fiscal year 1939, 36,383 miles of truck trail and 105,604 miles of trail were maintained at an average per mile cost of \$39 and \$6 respectively for work financed from the regular road funds. Included in this mileage is some 12,000 miles of truck trail and 7,200 miles of trail of unsatisfactory standard. The need of these for Forest transportation service made maintenance necessary although the costs per mile are much higher than for facilities of satisfactory standard and even when maintained these truck trails and trails do not render adequate service.

Significance: Every Forest activity dependent in any way on field work makes use of and needs a transportation system.

Each Development truck trail and trail on the existing and planned system will be used for fire detection or suppression. During a period of fire danger or of fighting a fire, the amount of use will be maximum. At other times the travel may be little. The average volume of traffic is no indication of value. When the need arises it must be met immediately; the truck trail or trail must be in existence and in satisfactory condition.

For fire detection, a truck trail, preferably, or a trail, to each lookout tower or cabin is a necessity. Truck trails and trails are the main reliance in fire suppression. The suppression force, supplies and equipment must reach a fire within a certain period of time after its discovery if the fire is to be quickly controlled, the damage kept small and the costs of suppression kept down. Truck trails afford shorter travel time, lower costs per ton mile and larger volumes of travel than trails. Trails are provided where the benefits from the truck trails do not justify the cost and where reduced travel time is not essential. Over the truck trails and to the point nearest or most accessible to the fire, trucks and buses transport men, food, fire tools, miscellaneous supplies, pumps, horses and mules, equipment for building fire lines, radio equipment. From that point, if not sufficiently close to the fire, the horses and mules haul material that can be packed. Whenever available, a trail cuts down travel time, hauling cost and fatigue of the fire fighting crews.

Through making the Forests accessible, truck trails promote the sale and utilization of Forest timber products; through decreasing the transportation cost, the price of the product to the consumer is decreased and the price paid to the Government for the raw material is increased. For home use or sales in towns and settlements, cordwood and poles are hauled in light trucks and wagons. For hauling out logs and lumber, the road has practically displaced the railroad. Logs and also lumber manufactured at sawmills in the forests, are now hauled over truck trails for distances of a few miles up to over 200 miles and with loads varying from light to very heavy.

Fast disappearing is the practice of driving cattle and sheep from the winter to the summer range and back to the market or shipping point. Great economies result through truck transportation. Also destruction of ground cover and the attractiveness of land used for driveways is avoided.

Truck trails and trails are not built for the sole purpose of providing transportation service for established, individual mines and mills but many of these profit from truck trails constructed for other Forest purposes. However through the construction of truck trails to areas undeveloped but of expected high mineralized value, the development of the mineral resources is materially aided.

The Federal Government profits through its use of truck trails constructed by others for the construction, operation and maintenance of power, irrigation, domestic supply, fish rearing pools and other water uses. These developers and users also reduce the cost of their products through using the Development truck trails.

Truck trails and trails promote and assist in the utilization of many miscellaneous forest products such as turpentine, bark, leaf mold, fruits, nuts, berries, holly, Christmas trees.

In volume of travel, the use of truck trails for various forms of recreation greatly exceeds the amount for any other Forest resource or use. The value of benefits to the public is also extremely great, although the direct financial returns to the Federal Government itself will be less than from investments for truck trails and trails serving fire protection or for timber, range or other product utilization. In 1938, there were 32 million recreationists in the Forests. This number was about equally divided between those at picnic spots, camps, summer homes and other recreation areas, hunting and fishing and those who traveled the roads to enjoy the Forest scenery.

For efficient administration, all parts of the National Forests, the ranger and guard stations, and other improvements and projects, must be readily accessible and at justifiable expenditure of time and money. The men responsible for administration must have truck trails and trails for ready access to the areas to be managed and protected and to the operations to be supervised and inspected.

These activities are great in number and widely diversified and scattered.

Additional to the use for some specific Forest resource or use there is even a greater use for public travel. This, for truck trails, embraces some enroute from coast to coast or traveling long distance. In the main, however, it consists of local travel, that is, trips by people living in or near the Forests, across the Forests or to some point within the Forest boundaries. Very largely these people are dependent upon privately owned land or resources inside the boundaries for their support. Alienated lands in the National Forests - roughly 19 percent of the total area - are used for growing timber and firewood, stock grazing, mining, resort sites, small business establishments and in other ways.

Plan of Work: Careful determination of the needs is essential for such a large undertaking located in 42 States, Alaska and Puerto Rico and involving an area one-tenth the size of the Continental United States. The planned system should include all truck trails and trails which are really essential. Equally important is the exclusion of those which afford some economies or advantages but which really are not essential or where the cost of securing and maintaining exceeds the benefits derived.

From the very beginning of the work, the transportation needs were studied and a system determined. By 1925 the great increase in the use of cars and trucks made evident that planning must be conducted on a scientific and systematic basis. Since the greatest and most urgent need was fire protection, first attention to this was given. No precedents for such planning existed and the Forest Service had to devise a method. This proved very satisfactory and all work necessary for Forests of particularly high fire hazard has been completed.

While this planning method also embraced needs for other purposes, later changes and increases in public travel and forest utilization requirements evidenced the necessity of intensive planning to meet the needs for all purposes. For such specialized planning, especially for resources, no precedents existed and a method had to be developed. Planning work has been actively underway for some two years. Completion in another two years is hoped for.

Briefly the All-Purpose Plan translates forest resources and activities into traffic demands and using such as a basis meets the requirements at the lowest practicable costs. Population and travel trends are studied; the needs of public travel in or across the Forests are determined; the timber, forage, power, mineral and other Forest resources are inventoried and the traffic originating from each is computed; all possible land uses, such as watersheds, timber, production, grazing, wild life, recreation are considered; conflicting land or resources are coordinated and adjusted to derive the greatest benefit; definite arrangement is made for roadless areas and to maintain primitive conditions. For each truck trail or trail, the required

standard is based on the character and amount of traffic. An essential qualification to inclusion in the planned system is that the average annual cost be less than the average value of benefits.

Completion of the planning now under way will require some adjustments in the present plan. Changes in resource utilization, public use, etc. will later require periodic adjustments or revisions. No attempt is made to forecast needs for more than 10 years. Accordingly the plan practically represents the known needs now existing.

As of June 30, 1940, the planned Development System was as follows:

Standard				

Miles				
	Total	Satisfactory	Unsatisfactory	Non-Existing
Truck Trails	118,307	52,142	35,195	30,970
Trails	157,501	111,499	27,925	18,077

The appropriation amount for a year being known, the annual program of work can be quickly and accurately determined. Provision for necessary maintenance and administration is first made. Through utilizing the transportation plan, specific construction or betterment work is approved on the basis of the greatest urgency and the largest benefit return for the amount invested.

The transportation plans show the approximate location of the truck trail or trail, the approved construction standard, the estimated cost and the kind and amount of estimated benefits. Also a record is kept of all necessary maintenance work - the project, time, frequency, kind, cost, organization, equipment and methods.

Necessary surveys are simple, quickly made and inexpensive, because of simplicity of road standard, comparatively little difficulties of location and construction, the low costs per mile and use of the day labor rather than the contract method. The job is essentially construction. Very little engineering is required and such as is necessary is supplied by the Forest Service engineers engaged in this and many other kinds of engineering work. With needs thoroughly known, so much data already available and the large and decentralized Forest utilized, quick expansions in volume of work and amount of expenditure have been and can be made, without loss in efficiency.

During the past 10 years the regular Forest Development appropriations have been supplemented by emergency appropriations and later by ERA, WPA and particularly CCC. Except for this great aid, probably the annual increases in required mileage and expenditure arising

from greater utilization, would have exceeded the annual mileage constructed or brought up to standard. This aid has now so decreased in amount that progress is almost entirely restricted to that possible from the regular appropriations. During the fiscal year 1939, 2,266 miles of truck trail were constructed or improved. Of this total, CCC provided 1,652 miles - 17 percent of the CCC mileage in 1934. Despite what would appear to be a large amount of construction, the planned truck trail system on June 30, 1939 was only 1 percent nearer completion than it was a year earlier - 45% in 1939 and 44 in 1938. The trail system was 71% satisfactory in 1939 as against 78% in 1938.

To complete the Development truck trail and trail system as now planned, will require work and expenditure for construction and betterment as follows:

	Mileage	Further Required Expenditure	Average Cost Per Mile
Truck Trails	66,165	\$136,509,200	\$2,063
Trails	46,002	<u>7,910,000</u>	<u>172</u>
Total		\$144,419,200	

EMERGENCY FUNDS

Project	: :Obligated: : 1940	:Estimated :Obligations: : 1941
Emergency Relief, Agriculture, Forest Service:	:	:
(Transfer from WPA)	:	:
Forest Roads and Trails:	:	:
Fire Preparedness	:\$ 712,887:	\$ 200,000
	:	:





